THE E.D.A. AND B.E.A.M.A. REPORTS

The ELECTRICAL REVIEW

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MARCH 24, 1933

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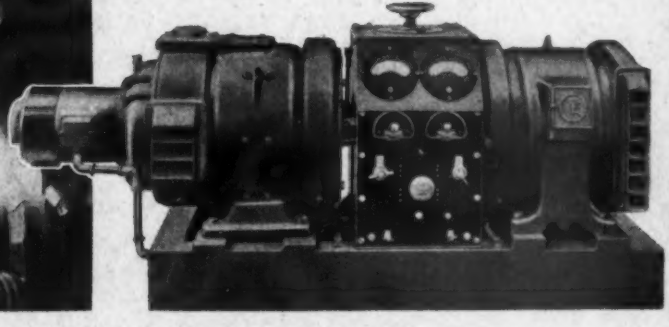

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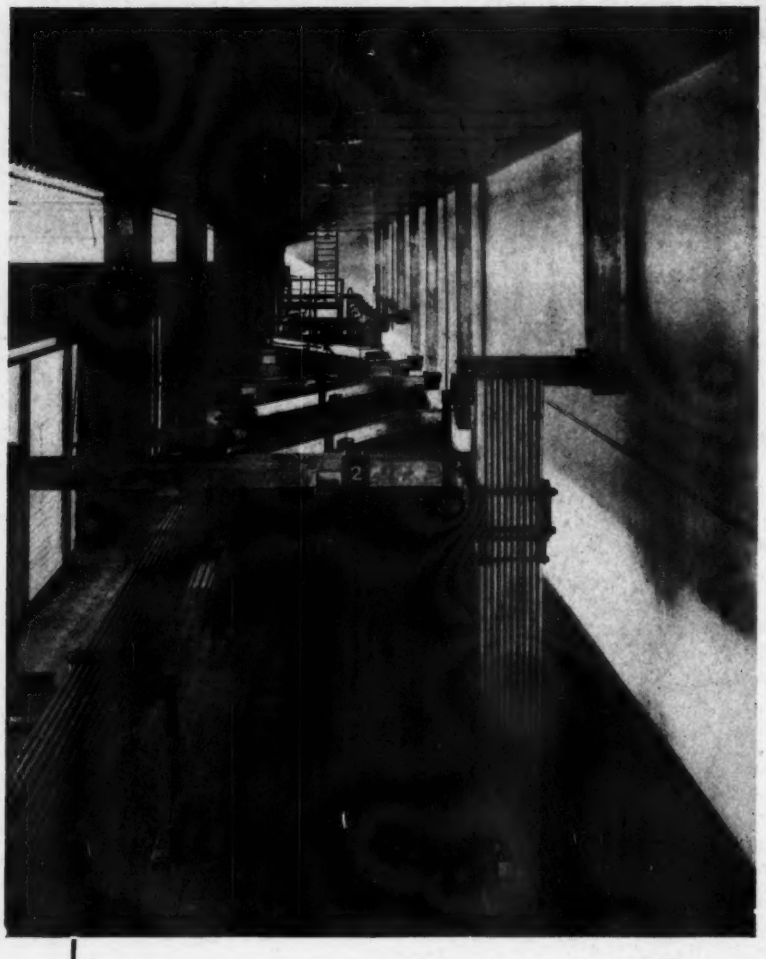

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Our Common Interest

IF anybody who attended last Friday's luncheon and annual meeting of the British Electrical Development Association expected to hear anything of a sensational nature he came away disappointed.

The Hon. Oliver Stanley, the new Minister of Transport, made a good impression at his first electrical function, and both his luncheon speech and that of Lord Meston in reply, were brief, businesslike, and very appropriate to the present stage of the electrical development movement. The annual meeting was the largest that we remember in the history of the organisation—how wonderfully lusty Beauchamp's baby has become!—and was worthy of more convenient accommodation.

The presidency has passed from Lord Meston to Lord Ashfield, and we are glad that the latter has intimated quite plainly that he has so many large interests in hand that not too much should be expected from him. Mr. H. C. Lamb, the vice-chairman, who is following Mr. C. H. Cox as chairman, is one of our most eminent and progressive municipal electricity supply chiefs, and we may be permitted to anticipate that he will give a definite leadership during the coming year to all other electricity undertakings at a time when a strong policy and unity of action are required.

Accelerated progress can be expected if the funds of the Association or, shall we say, the propaganda contributions of the industry, under the Central Board's guidance, are somehow brought up to a more substantial figure, enabling commercial operations of an efficient kind to begin whenever they are desirable.

This brings us to the one great problem which has absorbed so much time and thought for several years past, namely, how the funds for propaganda and sales development are to be substantially increased. From our abstract of the Council's report it will be seen that the electricity supply contributions have advanced to £31,452, while those of the manufacturers have fallen to £8,724, and those of the contractors at £834 and the wholesalers at £110 provide the element of humour. It may be noted that fifty-two manufacturers have pledged themselves to £5,000 a year rental for three years at the Building Centre.

Mr. Cox, who has completed a year of very useful work, expressed the conviction that if E.D.A.'s potentialities were fully realised by electricity concerns there would be no difficulty in obtaining the required funds, leaving the personnel to go straight ahead with what they want to do without the handicap of having to solicit subscriptions. Undertakings, big and little, and unassociated manufacturers are sharing in the benefit of general propaganda activities for which others provide the money.

It may be easier to influence the minds of such electricity undertakings than to draw funds from unassociated manufacturers, but there are circumstances in the case which may render it premature to discuss ways and means at this particular moment, or to inquire too closely who should rightly find the funds for greatly intensified activity. Some undertakings are spending a good deal of money and effort on their own account.

It may not be easy, it may not be desirable, to do everything through one great organisation or staff, or one big fund, but some way will, we hope, be found for interesting the whole community in the electrical possibilities that lie before the people of Britain.

Hope Deferred

"IF the present craze for ruthless economy, which is affecting trade, is substituted by a moderate programme of prudent expenditure, the present year should prove to be one of achievement and hope." We quote from the annual report of the Council of the British Electrical & Allied Manufacturers' Association, an abstract of which appears on page 414 of this issue. We have been hoping for a long time, but the opening words of the report give us little encouragement to expect great things, for it is remarked that the prospect of a final settlement of reparations and

international debt problems, which must precede world trade recovery, is as remote now as it was a year ago. Orders placed by the Central Electricity Board fell away further in 1932, and we are told to "anticipate" that the figure for 1933 will show a further reduction. The smaller apparatus manufacturers fared better than those in the heavy-plant sections, as they did in 1931. In the main "the downward sweep of home orders" continued last year, and to-day the only considerable home markets for electrical plant, apart from domestic electrification, thus left open are a more intensive industrial and railway electrification. One of the few bright spots will be found in the statement that an increase in employment has taken place in the electrical industry as a whole, though the number of workers engaged in electrical machinery production decreased. Looking forward: "At the moment it is difficult to gauge the time and strength of a possible revival," but we will continue to live in hope that the actual achievements may prove to be better than the predictions. As we go to press we turn with pleasure from this report to the optimistic statement made by Mr. R. P. Sloan at Tuesday's meeting of the North-Eastern Electric Supply Co.

Blackburn Meadows

THERE has not been much of novelty to be seen in new power stations in the last few years, so a visit paid to the new electricity works of Sheffield Corporation, described this week, was somewhat refreshing. Compressed-air operated main switchgear is, we believe, something entirely new in this country, and we await results of its working with much interest. Good reports concerning it have come from the Continent. To make provision for larger generating sets than those initially installed seems an obvious requirement, but it is not always done. The use of sewage effluent for cooling purposes has advantages, apart from the major one of economy, where river water is not too plentiful. We can at least congratulate Mr. E. Morgan, chief engineer and manager, on his obvious determination not to be tied to standard practice.

Propaganda and the Grid

IT is unfortunate that the grid has not received that intelligent attention in the Press, speaking generally, which is necessary if the general public is fully to realise the advantages that it was designed to place at its disposal. Lord Meston reminded his hearers last Friday that, while no great enterprise in the last fifty years could have started in less favourable circumstances, there was before us the opportunity of helping to make it a great national success by concentrating upon increasing the public knowledge of what electricity could do. With the success of the grid as our objective we shall benefit the community as a whole; by aiming at the maximum success of each individual undertaking we shall help to load up the grid; whichever way we look at it, our duty is plain, namely, to so organise and act that we shall sell as much electricity as the community privately, in industry, and in public facilities can consume. The recent boom in gas advertising in the Metropolitan area, though it may suggest nerviness, is a force to be reckoned with. It will not be effectively counteracted unless our electricity companies employ the same weapon.

Modern Steam Conditions

A LIMIT to the steam pressure at the turbine stop valve is imposed by the moisture content in the later stages of expansion. Developments in blade design, such as the use of stainless steel, root drainage, and sheathing have recently raised the permissible wetness appreciably; at the same time, developments in alloy steel have enabled high initial temperatures to be adopted. The result is that the practicable pressure and heat-drop values have been increased. Thus one of the two advantages of inter-stage reheating—the reduction of moisture at the l.p. end of the turbine—is not so pronounced as it was for steam conditions prevailing in this country. The other aspect of reheating—the increase in overall thermal efficiency (Rankine and regenerative cycle)—still remains, but Mr. W. S. Burge, in his I.E.E. paper, last night, expressed a doubt whether the additional capital cost and complication of the system would justify its use at pressures of about 650 lb. per sq. in. There are two questions that should be answered: What would the capital charges on the reheat extras amount to per kWh at load factors of 70 per cent.? And what difference will there be between grid operation in Great Britain and conditions in the U.S.A. that would account for 650 lb. per sq. in. being the most advanced general practice here, as against 1,200 to 1,500 lb. per sq. in. across the Atlantic?

Free Appliances

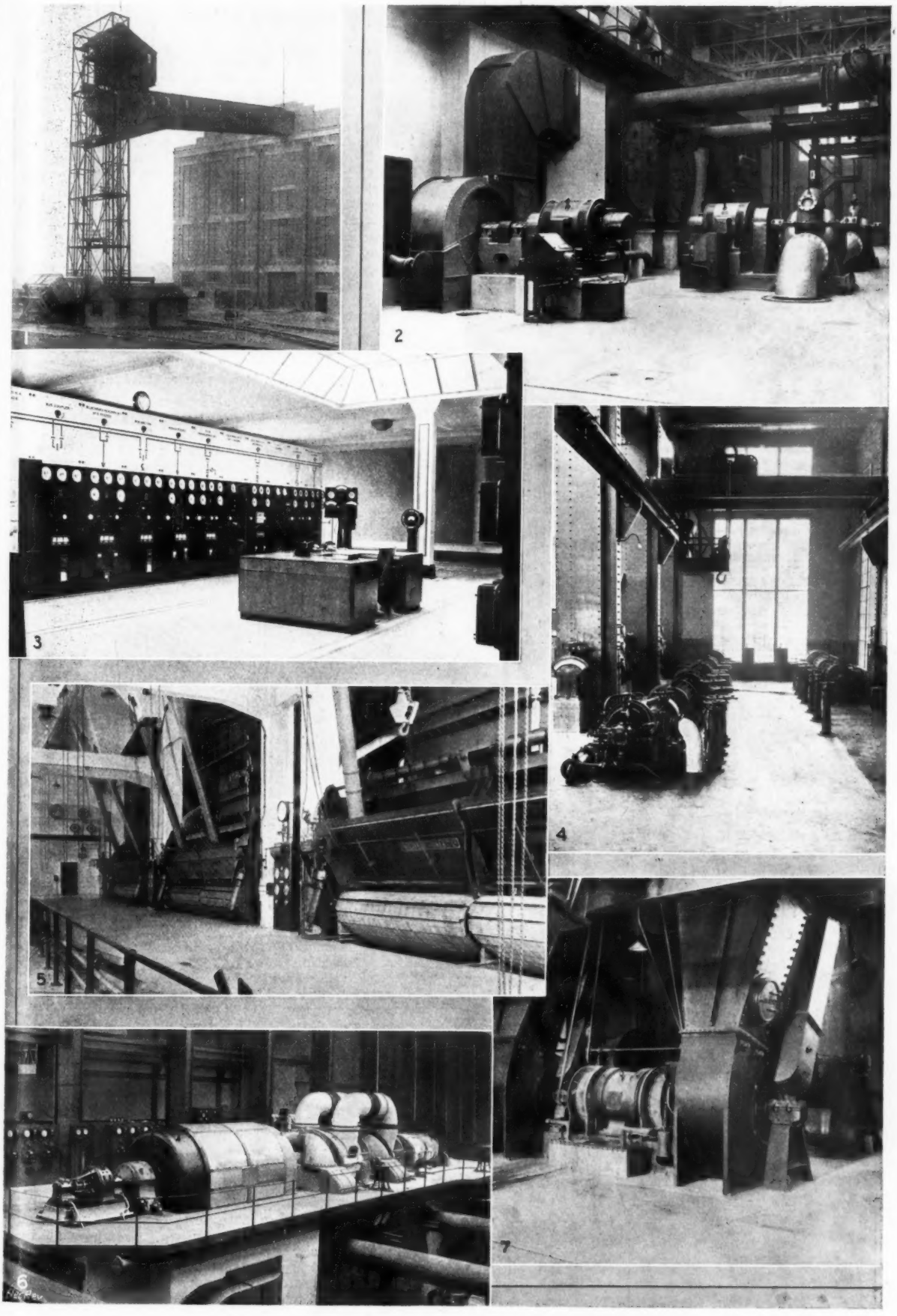
IN our leading columns of February 3rd we commented on the use of its trading surplus by a German supply undertaking to provide free electricity for a limited period and the probable effect of this on raising the standard of consumption. A correspondent draws our attention to a method which, we believe, has not been tried in this country. The suggestion is that supply undertakings making a surplus should not necessarily hand on the benefit to consumers as a reduction in the rate per kWh, but should present them with vouchers of a value proportionate to the annual consumption in each case. The vouchers would be taken in payment or part payment for electrical apparatus in the showrooms of the undertaking or approved contractor. The energy consumed by this apparatus would tend to increase the profits of the undertaking, and therefore of the value of the vouchers year by year. Many consumers would, we believe, appreciate the gift of an electrical device more than a small reduction in the tariff, and they would obtain a more intimate acquaintance with the showrooms and find out what apparatus was available. Another advantage of the scheme is that it would often influence consumers to buy apparatus of a better quality

Sillier and Sillier

THAT a charge of sabotage should be brought against British engineers in Russia is naturally regarded here as utterly ridiculous. The nature of the charge, as given in a broadcast report from Riga, is equally fantastic. It is stated that the blades of the turbines at Dnieprostroi have become corroded, and this is attributed to the malicious introduction of acid or sand into the casings. Apart from the fact that the Met-Vick was not responsible for the supply or erection of the turbines, the physical impossibility of the allegation being correct is obvious from the particulars given of this station in our issue of September 16th last. Each of the nine 62,000-kW turbines weighs 660 tons and each blade of the runners has a weight of about five tons. The pumping in of large quantities of acid or sand could not have been done without instant detection, and the vast amount of water passing through the runners would have prevented any appreciable damage in any case. From the technical point of view it is important to discover the reason for any corrosion (or possibly erosion) that has occurred, but preposterous suggestions of this kind will not help towards a solution.

The Convention of 1934

MR. JENNINGS justifiably shares our own impatience that the question of holding a national electrical convention has been left unsettled so long, and last Friday he urged immediate action, as we did here a week or two ago. Now that the new Council of E.D.A. is in the saddle, shall we get a move on? The subject has already been brought before the other Associations.



The New Blackburn Meadows Station at Sheffield

1. The external coal-handling plant—tippler, skip hoist and belt conveyor. 2. The condenser basement—alternator ventilating fan (left) and circulating pumps (right). 3. The control room (main board on left). 4. Two motor-driven and one turbine boiler feed pumps. 5. The three boilers from the firing floor. 6. The 25,000-kW three-cylinder turbo-alternator. 7. A group of fans for one of the boilers

D

The Sheffield Corporation's new station

Blackburn Meadows

COMPRESSED-AIR operated main switchgear; condenser cooling dependent on sewage effluent; high-pressure and high-temperature steaming; fluid-coupling control for the boiler draught fans; priming of the circulating water pumps by an external vacuum pump *via* suitable receiving equipment in which a vacuum is automatically maintained; h.p and i.p. turbine cylinders connected by the largest corrugated pipe ever made; layout spacings and dimensions for 50,000-kW sets; and the first three-cylinder turbine installed in this country. These are outstanding features of the new Blackburn Meadows power station of Sheffield electricity undertaking which is to be officially inaugurated by Prince George in two or three weeks' time.

Adjacent to the old war-time station, the new station is situated at the centre of gravity of Sheffield's industrial load, and its establishment is justified by normal growth and the relationship of the undertaking to the Central Electricity Board. The initial generating plant capacity is 25,000 kW in one set, and based on sets of this size the ultimate plant capacity is 100,000 kW.

Coal-handling and Boiler Plant

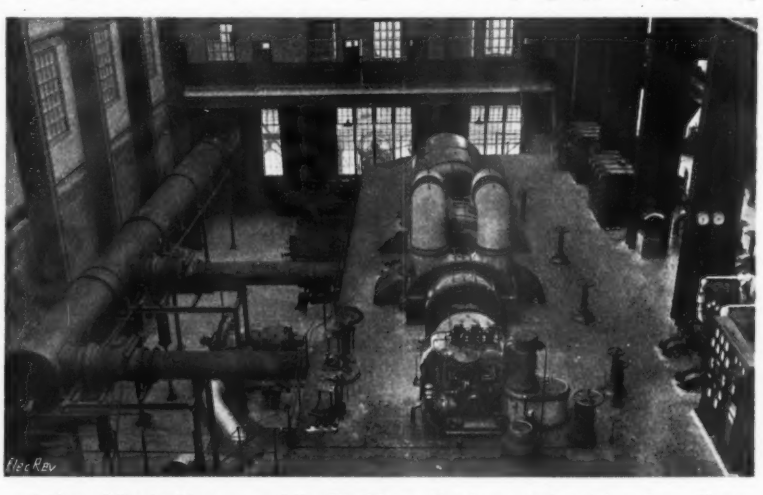
The station is served by both the L.N.E. and L.M.S. Railways. Coal can be delivered either direct to the boiler bunkers by duplicate tipplers, a skip hoist, and a belt conveyor at 140 tons per hour, or to a storage ground (20,000 tons) by another tippler and a revolving cantilever transporter crane at 50 tons per hour. Coal to the boilers is automatically weighed as it is tipped by Avery equipment. The three existing 156,000-lb. per hour (max.) tri-drum Stirling boilers constitute half the equipment for which the present boiler house is designed. The boilers have Bailey Walls forged drums supplied by Thomas Firth and John Brown, Ltd., twin "L" type Underfeed stokers, integral steaming economisers (Eco Power, Ltd.), type M.L.S. superheaters supplied by the Superheater Co., Ltd., and Underfeed plate type air heaters. The steaming conditions are 625 lb. per sq. in. and 800 deg. F.

Balanced draught is provided for each boiler by two forced-draught and one induced-draught fans situated in the ash basement. The f.d. fans are driven from one central motor, but each can be operated separately through its hydraulic coupling. All the fans have such speed control and are of the "Sirocco" double inlet type supplied by Davidson & Co., Ltd.

Ash handling is effected by a drag-link system operated in below-ground water troughs into which the ash is directly discharged from the two hoppers of each boiler. The system is designed for an ultimate capacity of 16 tons per hour. The trough system discharges the ash into a sump from which it is grabbed and elevated to an overhead hopper which feeds the existing aerial rope-way. From the boiler to the overhead hopper the whole operation is automatic. Poth the coal- and the ash-handling plant were supplied by the Mitchell Conveyor & Transporter Co., Ltd. Davidson grit arrestors serve the "Armco" iron coned-base 120-ft. (from ground) chimneys supplied by the Stirling Boiler Co., Ltd.

The Turbine Equipment

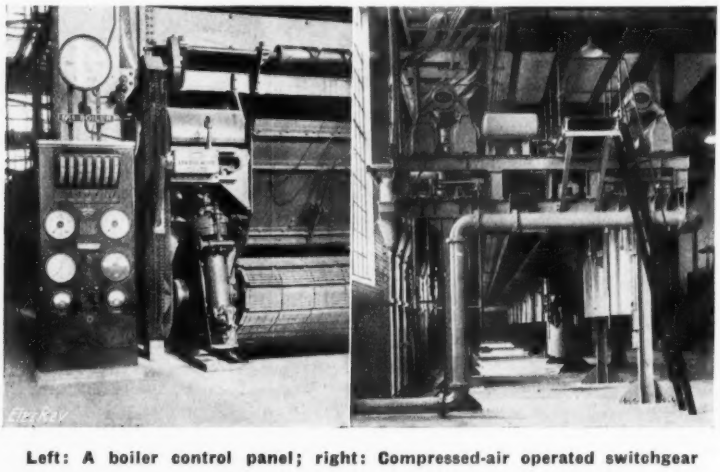
The English Electric set is of the double-exhaust type with impulse h.p and i.p. cylinder and a double-flow reaction l.p. cylinder. Its most economical rating is 20,000 kW (3,000 r.p.m.), and the guarantee steam conditions are 570 lb. per sq. in. and 770 deg. F. The English Electric surface condenser is of the regenerative twin spring-supported type having



A view of the turbine room of the Blackburn Meadows station taken from the travelling crane

a guaranteed duty of 157,700 lb. per hour with a vacuum of 28.37 in. (barometer 30). It is served by duplicate Worthington-Simpson circulating pumps (909,000 g.p.h.) and duplicate Drysdale condensate pumps (28,500 g.p.h.).

Condenser water cooling is effected in four natural-draught chimney-type towers (500,000 g.p.h., 100 deg. F. to 79 deg. F., air 55 deg. F., humidity 75 per cent.) supplied by the Davenport Engineering Co., Ltd. Purified effluent for make-up is obtained from an adjacent sewage disposal works and is re-chlorinated. The slight acidity is calculated to afford very satisfactory condenser operation without frequent cleaning.



Left: A boiler control panel; right: Compressed-air operated switchgear

Feed Heating Arrangements

Steam is bled from four points of the turbine—one from the h.p. cylinder, one from the l.p. cylinder, and one from each of the interconnectors. The feed water is heated up to 350 deg. F. at the economical load, and the make-up is obtained by evaporators which are also supplied with bled steam, the vapour being taken to an evaporator heater. When the evaporators are not in commission the evaporator heater is fed from the l.p. bleeding point which is thus not normally used. The evaporators are of the surface type supplied by C. & J. Weir, Ltd. There are two motor-driven and one turbine centrifugal feed pumps (each 25,000 g.p.h., 730 lb. per sq. in.) supplied by the Harland Engineering Co., Ltd. The feed-heating system also embraces two 128-lb. per hour

steam-jet two-stage Mirrlees-Watson air ejectors. A notable feature of the turbine and boiler equipment as a whole is a comprehensive layout of instruments supplied by the Electroflo Co., Ltd., and Geo. Kent, Ltd., designed to afford high-efficiency operation.

The Electrical System

The revolving-field alternator generates at 11,000 V, three-phase, 50 cycles, and its maximum rating is based on 0.8 power factor. It has closed-circuit ventilation with an external fan (75,000 cu. ft. per min.) and water cooling. The equipment was made by Heenan & Froude, Ltd., and James Keith & Blackman, Ltd. Simple direct excitation is employed.

There are ten 11,000-V, 1,500,000-kVA main metal-clad switches, 500 to 3,000 A, supplied by the General Electric Co., Ltd. Briefly, the operation is as follows. From a motor-driven compressor mounted on the switchgear compressed air is fed, *via* a main receiver, to a bus pipe arranged along the equipment. There is a tee-off connection to a secondary air receiver on each switch. Through a solenoid-operated valve, governed from the control room, air from the secondary receiver is admitted to a cylinder in which it operates a piston which, in turn, moves a vertical toothed rack, a gear wheel, and a horizontal shaft. From the last mentioned is driven a system of bevel wheels inside each phase switch tank. The bevel wheels actuate two spindles with a "Cibanite" bridge carrying the switch contacts. One rack-driven gear wheel operates a set of bevels in each phase tank.

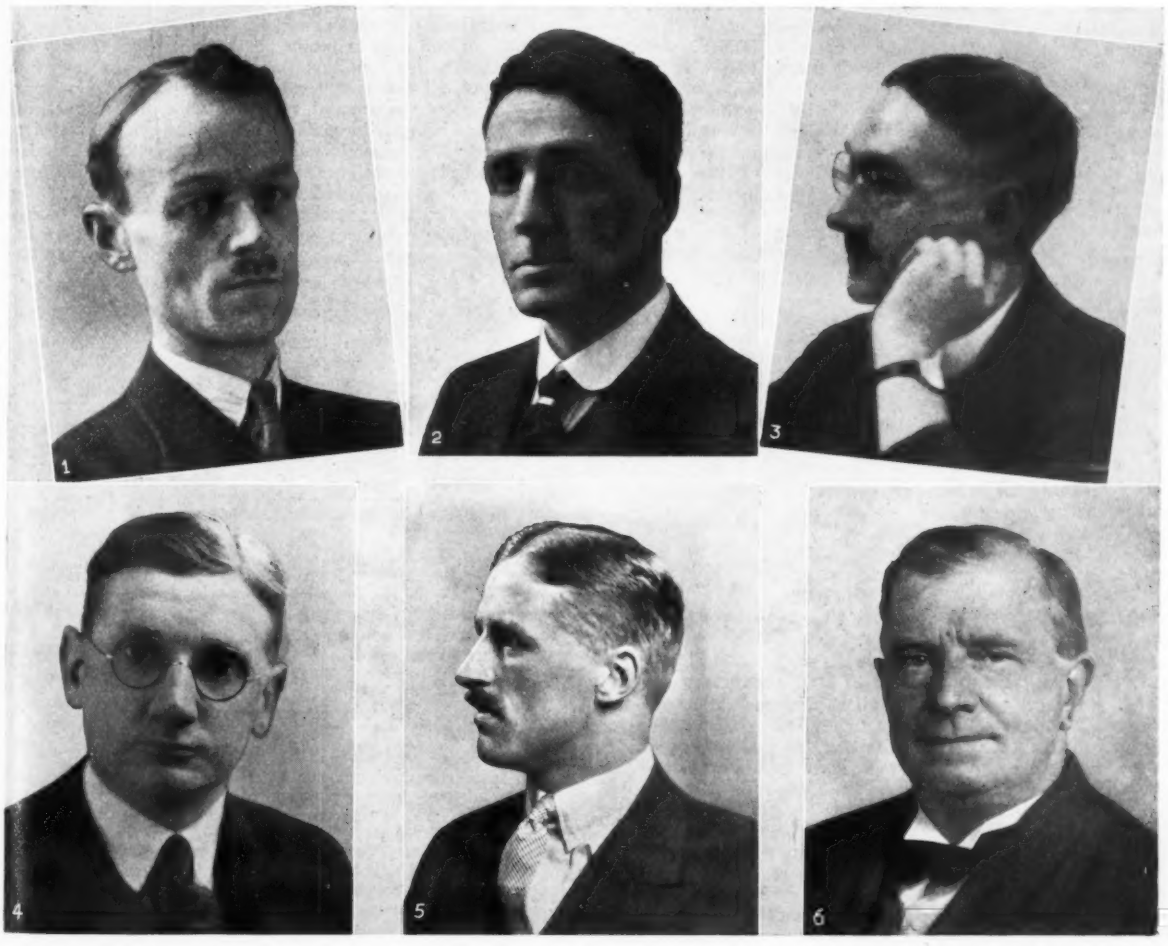
When the contacts are closed the air admission valve is automatically shut and the pressure air in the cylinder is automatically discharged. Latching gear attached to and engaged at the top of the rack is automatically released by the trip coil operated by the same switch as governs the compressed-air system. The major claim for compressed-air operation is its high working speed, representing an improvement on solenoid equipment.

In the links connecting the two Blackburn Meadows stations are three-phase banks of G.E.C. concrete reactors protecting the 500,000-kVA switchgear in the old station. The Neepsend station will be connected to Blackburn Meadows by a 66-kV overhead line through 30,000-kVA transformers.

The enamelled steel control board affords well spaced equipment, and with its mimic diagram the whole is very attractive; it was supplied by the General Electric Co., Ltd. The control room also houses the metering and control equipment for the adjacent sub-station of the Central Electricity Board. One of the main switches serves the five-panel auxiliaries switchboard through a three-phase reactance bank, and a l.p. auxiliaries board is supplied by three 1,500-kVA outdoor transformers produced by the British Electric Transformer Co., Ltd. The station generally is efficiently lighted by industrial fittings supplied by the General Electric Co., Ltd., the Edison Swan Electric Co., Ltd., and the Benjamin Electric, Ltd.

Some of the more important main and sub-contractors who have not already been mentioned are; The Brightside Foundry Co., Ltd. (pipe work); the Diamond Blower Co., Ltd. (soot blowers); Hopkinsons, Ltd. (boiler fittings and steam valves); J. Blakeborough & Sons, Ltd., and Gummers, Ltd. (water and oil valves); Copes, Ltd., & Hopkinsons, Ltd. (feed-water regulators); Stewarts & Lloyds, Ltd. (steam piping); Aiton & Co., Ltd. (feed-water piping and "Corwell" joints); Newalls Insulation Co., Ltd. (lagging); Newton, Chambers & Co., Ltd. (feed tanks); the Paterson Engineering Co., Ltd. (chlorination plant); Allen West & Co., Ltd., Brookhirst Switchgear, Ltd., Dalyte Electrical Co., Geo. Ellison, Ltd., Igranic Electric, Ltd., Parmiter, Hope & Sugden, Ltd., and A. Reyrolle & Co., Ltd. (starters and auxiliary switchgear); the D.P. Battery Co., Ltd. (works battery); the Hewittic Electric Co., Ltd. (rectifier charging plant); Electro-Mechanical Brake Co., Ltd. (air system for switchgear); W. T. Glover & Co., Ltd. (cables); Isles, Ltd. (cranes); Evans Lifts, Ltd. (lifts); and the Sturtevant Engineering Co., Ltd. (vacuum cleaning plant).

Driving Forces in the Industry: I.R.G.P. & Telegraph Works Co., Ltd.



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The Design of Permanent Magnets. By Edward Hughes, Ph.D.

A discussion of the method of presentation to students

ALL text-books dealing with the design of permanent magnets follow Evershed's example in his classic I.E.E. paper (Vol. 58) by emphasising that the optimum condition exists when the magnetic energy maintained in the gap per c.c. of magnet steel is a maximum. The natural inference is that in the piece of apparatus using the permanent magnet, energy is being abstracted from the gap, whereas actually it has to be *supplied* from an external source. Further, if the magnetic circuit be so designed that the gap energy per c.c. of magnet is a maximum, the flux density and, therefore, the torque on the moving system may be increased by reducing the length of the airgap—mechanical clearance permitting.

Mr. Edward Hughes

Consider the case of a magnet A (fig. 1) having pole-shoes SS of negligible reluctance and a demagnetising curve represented by fig. 2 for an excitation OA. The usual practice is to regard the negative magneto-motive force, OD $\times l$, required to reduce the flux density to zero, as neutralising an "inherent magneto-motive force" possessed by the magnet, by which the residual flux density OC is maintained. Consequently, if a negative magnetising force OE be applied, the corresponding flux density is EG and the inherent magneto-motive force of the magnet is still regarded as providing a component, OE$\times l$, to neutralise the demagnetising effect of the coil, leaving a component, ED$\times l$, to maintain the flux density OF in the steel.

Then, if instead of applying a negative M.M.F. we pull the shoes SS apart as in fig. 3, owing to the increased reluctance of the magnetic circuit, the flux density in the steel decreases, and it is only a matter of adjusting the gap length to some value g cm. in order that the density may be OF in fig. 2. The same M.M.F., ED$\times l$, is required to send the flux through the steel, and the remainder of the inherent M.M.F., namely OE$\times l$, is, therefore, the magnetic potential across the gap.

The student may now ask: What justification is there for assuming the inherent M.M.F. to remain constant as the gap is increased? For instance, if the pole-shoes are allowed to come together again will the flux density return to OC as would be expected with a constant M.M.F.? We may reply "No. Owing to hysteresis, the flux density will only increase to some value OJ, as would be the case if the pole-shoes were together and the magnetising force OE reduced to zero." The student then wants to know whether the apparent decrease in the M.M.F. of the magnet takes place while the gap is being increased or while it is being reduced. This apparent discrepancy tends to shake the student's confidence in the above method of deriving the gap potential; it is to overcome this difficulty that the following alternative method is suggested.

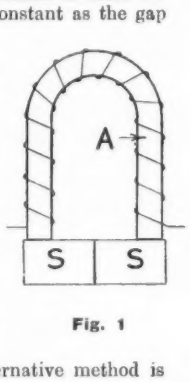


Fig. 1

An Explanation and an Example

When the pole-shoes are in contact with each other and the magnetising force OA has been reduced to zero and then increased to OE in the reverse direction, the flux density will be OF. If the pole-shoes be now gradually pulled apart and the negative magnetising force be at the same time reduced so as to keep the flux density constant at OF, a gap length g will be reached when the negative magnetising force has been reduced to zero. Since this gap has been introduced without any change in the steel, it follows that the M.M.F. required to send the flux through the magnet steel must have remained unaltered, and that the M.M.F. now available to send the flux across the gap must have been that neutralised by the negative M.M.F. OE$\times l$, of the magnetising coil before the gap was introduced.

Let B_g be the flux density in the gap corresponding to a density OF in the steel, A the effective area of the gap, and a the sectional area of the steel, then total flux = OF$\times a$ = $B_g \times A$. Also, the magnetic potential across the gap is expressed by $(B_g \times g)$ and by $(OE \times l)$, $\therefore EO \times l = B_g \times g$. Hence volume of magnet = $l\ a = B^2_g\ gA/OE \times OF$.

For any particular application of a magnet, a certain size of gap and a certain gap density are required, the most suitable values being determined partly by permissible dimensions and partly by working out several alternative designs and comparing their cost and performance. From the above expression it is evident that for a given flux density in and given dimensions of the gap, the volume of the magnet is a minimum when the product OE$\times$OF is a maximum. Since the energy stored per c.c. of airgap is $B^2_g/8\pi$ ergs, it naturally follows that under these conditions the gap energy per c.c. of magnet is also a maximum, a deduction that is really of no importance and is irrelevant to the issue. The variation of OE$\times$OF with the flux density is indicated by the dotted curve K reproduced in fig. 2.

The Current-ring Theory

Another question that invariably crops up is: What justification is there for regarding the magnet as possessing an inherent M.M.F.? It then becomes necessary to refer to the theories of permanent magnetism; undoubtedly the most useful is the Ampère current-ring theory as modified by Ewing and Evershed and given very fully in the latter's I.E.E. paper. Briefly, we may regard the steel as an assembly of minute current rings, these being electrons revolving about the nuclei of the atoms at an extremely high speed. When the steel is in the unmagnetised condition these current rings are arranged in small self-contained stable groups, each group giving rise to a local magnetic flux which acts as a magnetic bond for the group but which has no influence outside that group.

When an external M.M.F. is applied, these current rings become oriented so that their axes point more or less in the direction of the applied M.M.F. When the external M.M.F. is removed, these oriented current rings remain in a position of equilibrium and thus maintain the remanent flux density OC in fig. 2. In this condition there is no available energy in the magnet, all the energy supplied to the steel during magnetisation, less the amount returned while the magnetising current was being reduced to zero, having been dissipated as heat. Indeed, in order to reduce the flux, further energy has to be supplied; for instance, if the negative magnetising force be increased to OE (with the pole-shoes in contact), the energy supplied to the steel is given by the area GCF/4π ergs per c.c. If the pole-shoes be now gradually pulled apart and the negative magnetising force reduced so as to keep the flux density constant at OF, a gap length g is reached—as explained above—when the external magnetising force is zero. The work done on the pole-shoes (neglecting friction) is $(OF)^2 Ag/8\pi$ ergs, namely, that stored in the magnetic field of the gap.

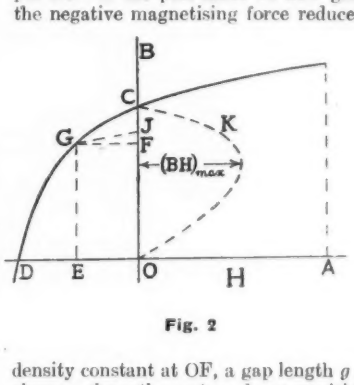


Fig. 2

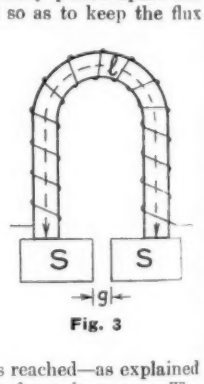


Fig. 3

The Watt Institute

In 1919 Birmingham celebrated the centenary of James Watt, and provided for a research scholarship in the Department of Mechanical Engineering in the University of Birmingham. A fund has since been accumulated which has enabled premises in Great Charles Street to be leased for the James Watt Memorial Institute, to serve as a home in which various engineering societies can hold meetings. A library is to be formed and the meeting hall is capable of seating 200 people. The opening date is to be announced in April and it is hoped that support for the project, financial and otherwise, will be forthcoming from as wide a circle as possible. All communications should be addressed to Mr. W. B. Challen, Derwent Works, Constitution Hill, Birmingham.

Welding for Tramways. By E. Dacre Lacy

Building-up is cheaper than replacement

ELECTRIC arc welding has been used by European tramway undertakings for repairing the permanent way, rolling stock equipment, cracks and breakages in gear cases, truck frames and axles, armature spindles, and numerous other pieces of apparatus, so saving expenditure on new parts. It has also been employed to rectify mistakes in design or assembly; thus, twenty-five new controllers which were to be supplied to a tramway company were found to have the rectangular sleeves of the controller handles 90 deg. out of standard position. To dismantle all the segments of the controller would have been a very long job, whereas, by arc welding, the sleeve was built up to cylindrical shape and then cut in the milling machine to suit the standard position. An existing controller was also altered and the contact segments extended by welding thick sheet steel on to the cast-steel carriers.

A repair frequently called for is that of the forged forks of brake gear. One of the legs is heated and opened out, and after slightly planing the fork is restored to its original shape in the press. To avoid opening out the fork, it may be built up on the outer surfaces to an amount equivalent to the wear on the inner surfaces, heated to white heat, and finished off under the steam hammer. This procedure is not so good as building up the inner surfaces, because future wear will be taken by the original metal instead of by the deposited metal, which is much harder.

An example of a reinforced axle box

One of the leading English tramway undertakings found cracks in the built-up sole-bars of twenty-three cars after only six months' service. The head welder had the cars run into the workshops one after the other at intervals of half an hour. The complete repair, including cutting chamfers, took thirty minutes for each car, and required only five or six electrodes for each crack. After being repaired each car was put into service again with the driver and conductor who had not left their posts. To make the repairs mechanically would have entailed replacing one-half of each sole-bar or bracing it by plates bolted to the inner surface; the cars would have been out of commission for at least three days.

Wheel-repairing Methods

Wheels, tyres, and flanges are subject to fairly rapid wear, owing to the action of brakes and friction when travelling round curves. Further, skidding due to sudden application of the brakes results in the formation of a flat spot on the tread; if the car is kept in commission this flat spot is extended by the repeated hammering action, and causes abnormal shocks in the frame and body of the car. Flanges may become worn on both sides either by friction against the rail flange or against the edge of the rail groove. Usually, if one of the flanges is worn on the tread side the flange of the other wheel will be worn to a similar extent on the opposite side.

The old method of reconditioning wheels was to turn the tyres in a lathe, which reduced the diameter by about 5 in. if the flange was only worn on the thread side, and 7 in. if on both sides. Usually the tyre was turned down three times and then scrapped. By building up the worn parts with the arc the tyre may be brought to practically the original dimensions at less than a third of the cost of turning. The continuous hammering action and the alternate heating and cooling of the tyre frequently result in its becoming too hard to be easily machined. There is every advantage in keeping this hardened metal, as the tread gradually assumes by constant polishing a shape most suited to the conditions prevailing.

The building up of tyres may be effected by three different methods:—

(1) Before building up a light cut is taken in the lathe in order to remove the flat spots and to regain the desired taper in the tread. If the welder is skilful the deposit will be sufficiently even to enable the wheel to be put into service without further turning. This is the method usually employed in America.

(2) In the European method the wheel set is removed from the car and the wheels and axle fixed vertically over a pit. After being cleaned with a wire brush, the upper surfaces of the flange are built up, working alternately on the bottom and top wheels. The metal from two or three electrodes is deposited on one wheel, then a similar amount on the other. Returning to the first wheel, the part diametrically opposite to the first deposit is built up; heating of the tyres is avoided without reducing the working speed, and the wheel centres will not become loose. For an economical weld the deposit must be made in a single layer (up to $\frac{3}{16}$ in. thick); according to the thickness of the deposit one electrode will suffice for a length of 6 to 9 in. For finishing the wheel requires only a light cut in the lathe.

(3) The wheels are rolled along the rails so that the part to be built up is always horizontal at about the highest point of the tyre. The passing from one point on the tyre to a point diametrically opposite is slower than when the axle is fixed vertically.

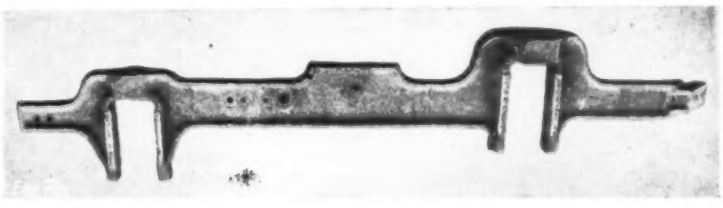
Mr. E. Dacre Lacy has had many years' experience of electric welding technique

In heating the tyres and shrinking them on to the wheel centres, considerable internal stresses are set up. This involves a risk of the tyre bursting unless the best types of electrodes only are employed. The metal deposited must be of equal hardness to that of the tyre. Hardness tests must be made on deposits on tyre steel, and not on ordinary steel.

The Treatment of Bearings

Journals are liable to seize and to develop grooves owing to abnormal stresses. They are built up by arranging the axle horizontally. After removing all grease, the journal is built up on the outer shoulder in a circular strip. The same operation is carried out on the inner shoulder, proceeding by quarter turns in order to avoid heating of the journal. These two ring deposits are then joined by continuous longitudinal strips. The deposits must be made one after the other without intervening spaces, as in filling them up too much current would be required for fusing the surface of the journal and the two ends of the deposits. There would be a risk of over-heating the journal, and it would also be difficult to get rid of the slag.

Tramcar mounts are set on the axle by means of two bearings at one end, divided horizontally, and by spring suspension at the other end. Owing to the severe shocks transmitted by the axle direct to the body of the motor, the cast-steel casing often fractures at the base of the ribs carrying the bearing. The repair, and at the same time the reinforcement of this



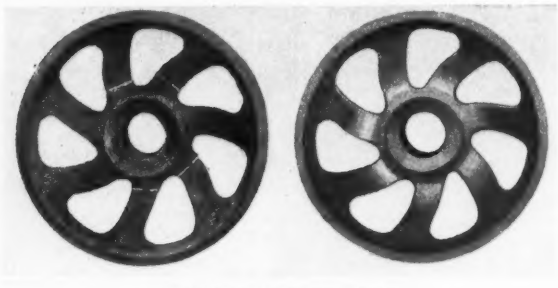
A tramway bogie frame

part, which is subject to considerable stress, is easily effected by arc welding, provided certain precautions are taken to avoid the necessity of machining or reboring the repair bearing.

The two parts to be welded together are firmly bolted on to a perfectly flat straightening plate of suitable thickness (3.25 in.×4 in.) and the surfaces of the fracture are made to meet as far as possible. After tightening up all bolts, a wide V-shaped chamber is cut slightly deeper than half the thickness on the right of the fracture. The parts are then marked at several points and the chamfer is filled with good electrode metal. Wherever possible, an extra layer should be left for reinforcement. The other side of the fracture is chamfered and filled up in the same way without removing the bolts from the plate; the second chamfer should overlap to a considerable extent at the base of the first cut. If blow-holes are found

when cutting chamfers, the surrounding inferior metal should be removed either with the arc or with a chisel. Care must be taken not to overheat the parts and the straightening plate must be left bolted until the work has entirely cooled off.

If some slight deformation should develop the weld can be brought to a light red heat, and the casing straightened with a few taps of the hammer or a light cut with the plane on a cast-iron surface plate. Hammering at light red heat eliminates internal tension, but is not essential. The best quality



Welded-up tramcar wheels

of electrode must be used, depositing a metal capable of being easily forged.

Motor Casings and Gears

Motor casings, which have become worn at the bearings, and even the cast-steel shell of bearings lined with anti-friction metal may thus be built up. One of our leading tramway companies recently altered several motor casings by bringing the axis of the motor nearer by $\frac{3}{16}$ in. to the centre line of the axle; this was done by building up one-half of the bearings in the casing, and then reboring and planing the bearings.

The gear box may be considerably reduced in weight and improved by the use of arc welding; as it has only to withstand secondary stresses, it may be made of sheet metal 3 mm. thick provided the joints are oil-tight. Tramcar gears mostly consist of a centre in two halves, each fitted with a toothed rim of special hard cast steel, fixed to the centre by a dovetail joint, and shrunk on hot. The toothed rim may be prevented from sliding in the centre by fixing it with a weld at several points on both sides; a dozen electrodes will suffice. In new gear wheels it is more economical to eliminate the dovetail joint, the special steel rims being welded on to the centres; turning, straightening, and milling may be done after welding.

When axle-box guides are much worn they may be reconditioned by the insertion of short pieces of channel iron in the grooves. In order to facilitate welding, the flanges of the channel irons should project slightly and the opening of the grooves should be widened. Loose joints in wooden car bodies may be very efficiently reinforced by means of rigid angles consisting of flat bars braced by welded tubes screwed or bolted between the uprights in the space between the inner and outer walls of the body.

The Permanent Way

Electric welding as applied to permanent-way work is practically confined to three types of electrodes, mild-steel, high-carbon, and manganese. Scale rust, cement, pitch, &c., are all enemies of good welding, and chipping and wire-brushing is desirable, especially for fish-plate welding; clean surfaces enable the arc to be continuously maintained without excessive current, and the slag to be easily controlled.

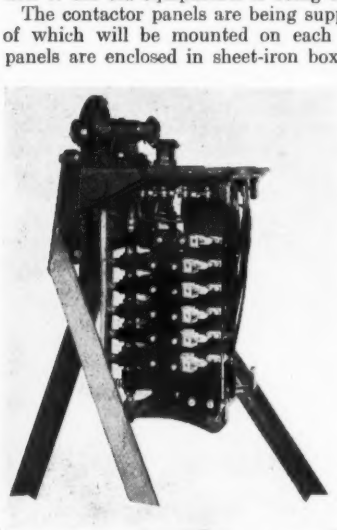
Fish-plate welding involves the joining of two high-carbon steels usually with a mild-steel electrode. A slightly higher current than normal should be used, but the speed of travel should be reduced to allow for proper amalgamation. Most welders use the higher current, but travel much too fast. Excessive current is the cause of much poor welding; from 150 to 175 A for No. 6 gauge electrodes is quite high enough, even when time is limited, but 200 A is detrimental without producing quicker results.

Electric Oil-well Equipment

Contactor control gear for Burma

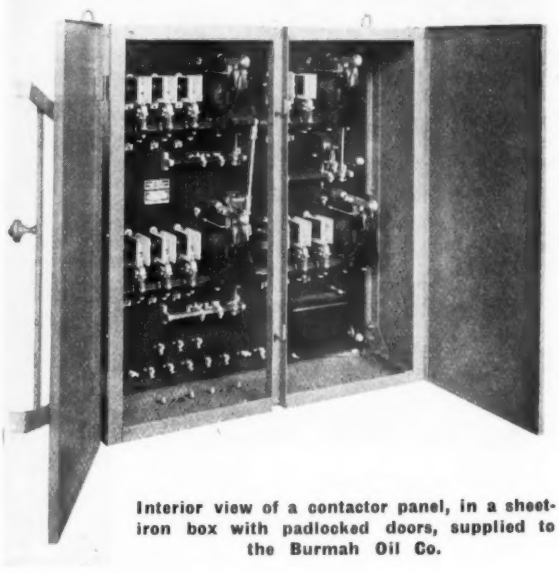
A LITTLE over two years ago the British Thomson-Houston Co., Ltd., supplied to the Burmah Oil Company a 200-h.p. oil-well drilling equipment, the control unit of which consisted of a stout welded pipe frame on which the contactor panels and resistances were mounted. The company has recently obtained an order for nine sets of contactor control gear for converting existing drilling equipments originally supplied with cam-operated main controllers. The modification to the old equipments is being carried out on site.

The contactor panels are being supplied in two sections, one of which will be mounted on each end of the frame. The panels are enclosed in sheet-iron boxes with doors which can be padlocked. Side doors are provided to give easy access to the back of the panel and all terminals and strip connections are secured by a system of locking to meet the arduous conditions of service. As many as possible of the old resistance boxes have been utilised, but a number of new ones had to be supplied of the "unbreakable" type.



A master controller showing the contact mechanism

The specially developed master controller embodies a number of small cam-operated silver tip contacts. The cams and arms carrying the contacts are made from a new moulded compound of exceptional strength and light weight. The cover takes the form of a tank, so that if required for use in dangerous situations the controller can be oil immersed. Operation is through a bevel gear on the cap plate and a flexible coupling with a large motor-car type hand wheel. The scheme of control provides ten points forward and reverse with balanced resistances on each step. The first two points give low-speed running on light load, and the final four points are under time limit control provided by pendulum relays on the contactors concerned. This prevents too rapid acceleration on the final notches and is particularly valuable as a protection to the motor when it is being subjected to rapid reversals, such as occur when tubing is drawn from the well.



Interior view of a contactor panel, in a sheet-iron box with padlocked doors, supplied to the Burmah Oil Co.

The motors are rated at 100 and 125 h.p., and some operate in pairs on a single drilling rig. The control equipments for these double units are two single sets operated by a single master controller. By means of a small control switch either one of the units can be shut down as required, thus leaving a single motor under power and so providing economical running under conditions of light load. Overload protection is provided by thermal relays operated by special current transformers in the stator circuit; the tripping of any one will shut down both equipments. Short-circuit protection is provided by the existing instantaneous overload relays which trip out the main circuit breaker.

Domestic Apparatus in France

The past year's developments and improvements

By OUR PARIS CORRESPONDENT

THE gradual development of domestic electrical equipment in France has been marked, each year, at the Salon des Arts Ménagères, and the following notes indicate some of the further improvements seen this year.

To deal with the lighter apparatus first, there is a toaster which automatically turns the bread. The movement is effected merely by opening one side of the toaster and then closing it again. The apparatus is finished in nickel.

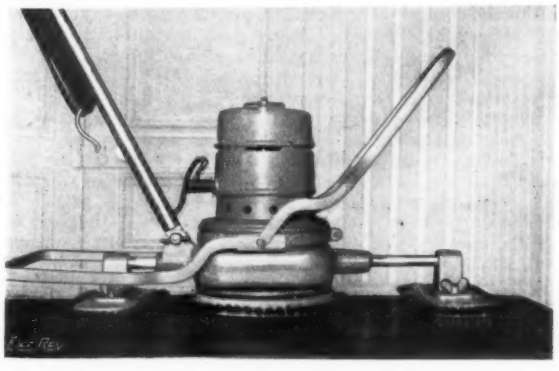
An " Electric Trousseau " seen comprises a compact little set of electrical appliances useful to travellers. In a specially constructed leather case an electric iron (with a collapsible handle), a heater and curling tongs are placed and arranged in such a way so as to take up the minimum space. The iron can be turned into a small heater, the tongs act as a handle for a pot, and one could even prepare a small meal with the equipment; our illustration shows the iron in use as a hot-plate.

Some electric heaters seen at the Salon des Arts Ménagères

Smaller Cookers

A new plate heater, which stands by the side of the table, provides warm plates as they are wanted. Particularly noticeable in the cooking section was the reduced size of cookers and ovens. There are many small ovens which can be placed anywhere—on tables and shelves if necessary. They are not heavy, and are simply plugged into a wall socket. One very small and compact oven, weighing only 13 kg., has a special clock attached which functions as soon as the current is switched on, so that the cook can see exactly how long her foodstuff has been cooking. The loading is from 660 to 2,000 W. Gradually the large cooker with the oven at the bottom is being replaced by the table cooker with a shelf under the hob unit beside the oven.

Improved appearance is obviously playing a large part in the development of the electric radiator, and one type consists of nickel tubes fixed in the walls. The effect is very striking and a complete change from the usual type of apparatus. Particularly noticeable is the change from the small heater, placed on the hearth, to the various types of wall radiators. Central heating has become a habit in France, so that if there is to be electric heating, then the equipment must be of such a nature as to heat the whole apartment. Hence the small 500-W heater appears to be gradually losing its popularity.



Floor polisher with interchangeable brushes

Dishwashers were more prominent than usual, not because of any particular technical advance, but rather because manufacturers are just commencing to feel what the housewife wants. Until now the makers have produced machines only of interest to hotels, restaurants, or, perhaps, very large houses. S.C.A.M., however, has now produced a much smaller machine for more general domestic use.

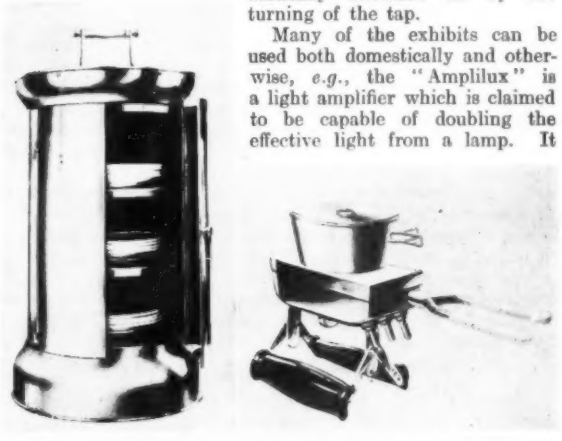
The " Tadiphone " combined painting and radio receiver

While most of the floor polishers shown are too large for the small house, they embrace some interesting features. The brushes can be replaced by a variety of attachments; for instance, scrubbing brushes, felt for finishing, &c. The smallest apparatus on show weighs some 35 kg.

Water Heating Developments

The development in water heaters seems to be towards small capacity equipments combined with larger heating elements. Models holding about ten pints were seen. They are thermostatically controlled, loaded up to about 500 W, and are automatically switched on by the turning of the tap.

Many of the exhibits can be used both domestically and otherwise, *e.g.*, the "Amplilux" is a light amplifier which is claimed to be capable of doubling the effective light from a lamp. It is constructed of special glass with prismatic section and slightly concave exterior face. The device is placed upon the axis of the lamp in such a way that its lower surface is on a level with the spiral filament of the lamp, and its position may be varied by special screws.



An electric plate warmer, and a component of the " Elsotric Trousseau " serving as a cooking outfit

A movement towards encouraging people to drink more water has resulted in the introduction of special sterilisers. Of the several working principles employed for sterilising few are as practical—for the home—as that of mixing ozone with the water. Ozone is produced by the action of electricity on the oxygen of the air, and is mixed with the water by a special nozzle. The ordinary household apparatus holds from 150 litres of ozone treated water, and is loaded at 35 W. The ozone generator has flat, water-cooled electrodes which permit continuous operation.

A novelty seen is the " Tadiphone," a combined radio set and painting. All that is seen of the radio set is three small operating knobs.

Side-entry Wall Plugs

The British Standard Institution has issued a revision slip (C.C. 9440) for insertion in the B.S.S. for side-entry wall plugs and sockets for domestic purposes, No. 372-1930. Clauses 14 and 38 (contact tubes) are thereby cancelled and new ones substituted.

The B.E.A.M.A. Report

THE report of the Council of the British Electrical and Allied Manufacturers' Association for the year 1932 states that the prospect of settlement in world trade seems as remote now as it was a year ago. The forthcoming World Economic Conference may effect an improvement in the general situation. It is to be feared, however, that it will do no more than sanction the prolongation of debts and reparations and other payments between the nations, which produce the present deficiencies of purchasing power and the continuance of the depression.

In 1932 the downward sweep of home orders continued. The recorded value of those placed by the Central Electricity Board, which, in 1930, amounted to £11,000,000 and, in 1931, to £3,000,000, was, in 1932, only £2,150,000. A prudent course would thus seem to be to anticipate that the figure will have suffered further reduction at the end of 1933. The only considerable home markets for electrical plant, apart from domestic electrification, thus left open would seem to be in more intensive industrial electrification and in railway electrification. Grid orders were executed at rock-bottom prices, and so far as the manufacturers were concerned, the work left little or no margin of profit.

There was a very severe decline in home orders for switchgear of the heavy type. The medium classes were not so seriously affected, and a distinct tendency towards improvement was noticeable in the export market. Turbine business remained at the unremunerative level of 1931; the output of 1932 being equivalent to that of 1931 so far as capacity was concerned, but as the average size increased, the number of units ordered decreased. One unit of 105,000 kW at continuous maximum rating will, when completed, be the largest in Europe. Converting plant, largely owing to the change of frequency in certain districts, showed a considerable increase over the low figures of the previous year. Transformer contracts declined considerably, and prices continued to fall until the second half of the year. Later, however, a tendency to rise became apparent, but they still did not permit of any profit margin. The turnover in small motors fell slightly.

The manufacturers of smaller apparatus again fared better than those in the heavy plant sections. In certain lines, such as accessories, they had to face severe under-cutting from Continental competitors, and the present level of duties on imports is ineffective against that competition.

An increase of employment has taken place throughout the electrical industry as a whole, electrical wiring and contracting and electric cables, apparatus and lamps, from about 191,000 in 1931 to 201,000 in 1932, although employment in electrical machinery production decreased.

At the moment it is difficult to gauge the time and strength of a possible revival. Debt cancellation would certainly prove a great impetus to trade restoration. The United Kingdom is probably, on the whole, in the best position to secure any advantages which it might bring. If the present craze for ruthless economy, which is affecting trade, is substituted by a moderate programme of prudent expenditure, the present year should prove to be one of achievement and hope.

Tariffs and Imports

Shortly after the Ottawa Conference, the Council saw the need for dividing tariff work into "home" and "export," and appointed an additional tariff committee to deal exclusively with all overseas tariff matters, both committees exchanging information and reporting monthly to the Council.

At the instance of the Council an agreement between the suppliers and consumers of copper was drawn up, which provided for deferring the imposition of the proposed duty unless adequate safeguards were given against insufficient supplies and excessive prices, and, further, that the duty, when imposed, should be repealed if it was found to work adversely to British industry. It is hoped that an agreement in similar terms will be reached in the case of lead.

An application is being made to the Import Duties Advisory Committee on behalf of the Accessories Section for increases of duty on certain lines of electrical accessories. The application is supported by the great majority of the British manufacturers as well as by a number of important associations. The Association was appointed by the Import Duties Advisory Committee as the authority for recommending whether or not single units of machinery and apparatus, which users or agents wish to import into this country free of duty, should be allowed to be so imported. The staff examined and made recommendations in about eighty cases of which thirty-five were against allowing the imports on the grounds that identical machinery or apparatus, or similar goods giving equal service, could be had in this country.

An application has been made on behalf of the Accessories Section, for an order under the Mechandise Marks Act.

The I.M.E.A.-B.E.A.M.A. proposed amendments to I.E.E. Model Conditions "A" referred to in the last report were submitted to the Institution but a decision has not yet been arrived at. New editions of B.E.A.M.A. Conditions "A" and "B," embodying important amendments, were recently issued to all members. The rule governing the use of Fair Wages Clauses was amended.

Research and Education

Reference is made to the 1932 report of the Research Association, and the attention of members is drawn to the foreword by Mr. C. C. Paterson in which he emphasised the constant need for distinguishing clearly between the sort of "specific" researches which an individual firm might and ought to do for itself, and those wider researches dealing with fundamental problems, for which only a large organisation, backed by the co-operation of a whole industry, was adequately equipped.

Mr. Paterson also pointed out that the "sinews of war" were derived mainly from the supply side of the industry. The basis of contribution on the manufacturing side—"once the mainstay of the E.R.A."—has had to undergo revision. The old block-grant system can now no longer be preserved in its entirety; and the E.R.A. will, in future, look to the manufacturers direct for a part of their income.

The Education Committee reports a further fall of twenty-three in the number of overseas students in members' works at the year-end, the total being 172.

The Joint Committee of the F.B.I. and the China Association, under the chairmanship of Lt.-Col. R. K. Morcom, held a series of meetings during 1932, and produced a scholarship scheme. The Universities China Committee in London approved this and allocated to it the sum of £500.

After touching upon other educational matters, the report says that it is essential that the present acute depression shall not militate against the proper training of higher grade university and senior technical college men for technical and managerial positions in the industry, which, if it is to compete successfully for world trade, requires first of all a thoroughly competent higher staff.

In a section dealing with traffic the report covers such matters as the rail versus road controversy, London passenger transport, general classification of merchandise, shipping rates for heavy machinery, Suez Canal dues, and deferred rates on shipping freights.

Brief particulars are given of the principal British Standard Specifications published during the year.

The Export Committee

The attention of the Export Committee was mainly devoted during the year to the position arising out of our departure from the gold standard and to the exchange restrictions in various parts of the world, particulars of which they had before them in relation to no less than thirty-six countries. The constitution of the India Overseas Committee was revised during the year to bring it into line with that of the Australia Overseas Committee. At certain inquiries by the Australian Tariff Board into the duties on electrical apparatus, the Association was represented and certain reductions were obtained.

The economic work imposed upon the Economic and Statistical Department during the year showed a distinct increase.

The third International Steam Tables Conference was to be held in the United States during September, but, owing to the prevailing economic conditions, it was decided to postpone it. Progress has been made in all research centres, and it is anticipated that the next Conference will bring much nearer the final publication of international steam tables.

Referring to the appointment of M. H. C. Siddeley as B.E.A.M.A. delegate to Argentina the report says that the membership of the B.E.A.M.A. Argentine Committee comprises most of the important members of the Association and all those who have any direct interest in Argentine business.

Participation of B.E.A.M.A. members in the Building Centre is mentioned and the work of E.D.A. during the year is briefly reviewed.

We have received at the moment of going to press an official summary of the annual meeting held on Thursday last week. Mr. M. J. Railing presided and said he was glad to say that in these difficult times the Association budget was in a healthy condition. A great deal of extra time had been devoted to the study of what constituted right publicity in the interests of the industry and lines of future development had been settled. The Association was more and more consulted by the Government and outside bodies. The all-round benefit of the new tariffs was bound to reflect in the long run on the electrical industry as well. Mr. Railing expressed appreciation of the work of Mr. V. Watlington, the additional director. The B.E.A.M.A. had now completed twenty-one years' work, and it was now more necessary than ever that it should be strong.

The Work of E.D.A. in 1932

IN its report for the past year, which was presented at the annual meeting on Friday last week, the Council of the British Electrical Development Association reported that fifty-one additional supply undertakings were enrolled as members during the year; thirty-five increased the rate of their subscriptions; and the total contributions of the Supply Section amounted to £31,452, against £28,230 for 1931. Of the total revenue of £41,122 (against £40,716), electricity supply undertakings found (as above) £31,452, manufacturers £8,724, contractors £836, and wholesalers £110. The contractors showed a slight advance but the manufacturers and the wholesalers were down.

The expenditure of the Association was devoted as to 55 per cent. to advertising, publicity, exhibitions and lecture service, and propaganda through the E.A.W.; 15 per cent. to area committees; and 18 per cent. to salaries and wages.

The membership analysis shows that 467 supply undertakings are members as compared with 445 a year previously; 208 are companies, 235 local authorities, and twenty-four Colonial. The manufacturing, contracting and wholesaling membership stands at 1,932 members—an increase of eighty.

For the electric cooking campaign 115,259 copies of the 16-page booklet "Electric Cooking" were sold, mostly to supply undertakings; 250,000 booklets, posters, &c., were also distributed. The national advertising work in connection with the campaign resulted in over 1,000 inquiries being received at headquarters, apart from local inquiries. Questionnaires issued to supply undertakings showed that the campaign "created an increased demand for electric cooking equipment."

The hotel lighting campaign led 200 hotels to apply direct to headquarters for assistance and fifty-six applications resulted from advertising in the hotel trade Press. Upwards of 1,000 hotels used reports on the improvement of their lighting and "a great deal of business" was obtained. A popular campaign designed to increase the use of electric fires in hotel bedrooms, was run by the Publicity and Campaign Committee with the assistance of representatives of four fire makers and two meter makers. Other campaigns related to electric furnaces and Christmas presents.

A Variety of Activities

Under special development work the report reviews operations connected with industrial electric heating, rural and agricultural applications, electric trolley-bus traction, street lighting, domestic water heating and domestic appliances, and electric cooking. The exhibition work of the year included the British Industries Fair, the Royal Agricultural Society's Show, and particularly the operations connected with the new Building Centre where the Council acquired space for electrical exhibits to a rental value of £5,000 per annum for a period of three years; most of the space has been sub-let to fifty-six electrical manufacturers. During the year 2,500 inquiries were dealt with and "valuable business has accrued."

E.D.A.'s services in the circulation of its own programme of activities, in editorial propaganda and its lecture service to trades, professions, associations, and the public are reviewed and reference is also made to the Public Speaking Competition (to improve electrical salesmanship), as well as to the salesmanship conferences, while the Director of the Electrical Association for Women gives a lengthy report.

The following reference is made to a matter much discussed in our pages of late:—

> "The Council have under consideration the question of a National Electrical Convention and representations have been made to the interested Associations."

The Luncheon

At the luncheon which preceded the annual meeting there was a company of about 470, representing all sections of the industry. Lord Meston (president) was in the chair. The toast of "The British Electrical Industry" was proposed by the Hon. Oliver Stanley (Minister of Transport), who referred with amazement to the steady growth in electricity sold from 3,650 million kWh in 1922 (100 per head of population) to over 10,000 million kWh in 1932 (225 per head). He said that there was a vast scope for selling light, heat and power for use in everyday conditions of living. With the completion of the grid the spotlight of public attention would be transferred from production to distribution. There was an enormous field for undertakings in providing service for domestic premises and for manufacturing industries by linking idle capital to useful and remunerative work.

The great businesses of the nineteenth century were not built up by sitting down and waiting for an ascertained demand. Their owners did not wait for enough consumers to give a return of six per cent. on their money before they would produce the goods. We needed the same spirit of adventure and belief in the future; if we had no belief in the future there was no incentive to work for the present. If we worked in the spirit of those manufacturers we should benefit not only our own industry, but also the nation as a whole. He hoped there would be no diminution in the interest taken in the work of the Association in bringing the knowledge of what electricity could do to the general public. The extent to which electricity was used in the home would be largely determined by women, and it fell to the E.A.W. to arouse their interest.

Lord Meston appealed to manufacturers, supply authorities, financiers and contractors to support the work of E.D.A. because it benefited all. No great enterprise in the last fifty years could have started in less favourable circumstances than the grid, but by promoting public knowledge of what electricity could do they would help to make it a great national success. He welcomed Lord Ashfield as the new president of the Association.

The Annual Meeting

Lord Meston, as the retiring president, took the chair at the annual meeting. Before the actual proceedings commenced, however, Lord Ashfield—who was compelled to leave

Mr. C. H. Cox, retiring chairman of the E.D.A. Council, and Mr. R. S. Downe, the new vice-chairman

at once to keep another appointment—expressed his appreciation of being elected president of the Association. He mentioned that by early training and subsequent experience in the U.S.A. and in this country, publicity made a special appeal to him. He promised to do everything possible for the Association during his year of office, but added that his many other interests might prevent him from giving as much time to the work as he would wish.

Mr. C. H. Cox (chairman of the Council) presented the report and accounts, and in doing so reviewed the year's work as we have done in our abstract printed above. He added that during the past few weeks he had attended a good many of the Area Committee annual meetings and had been brought into close touch with engineers and chairman and members of electricity committees. He added: "Some of these conversations left in my mind not the slightest doubt that if those who are responsible for the operation of our undertakings fully realised the extent of the work which the Association is doing and the important work which the Association could do if its funds were adequate to the task, all the revenue which is required would be forthcoming and the Association would be in a position to devote itself entirely to the work for which it exists instead of being preoccupied to such a large extent as it is at the present time with questions of ways and means."

Mr. Cox did not make any reference to the question of a National Convention to which we have alluded above, but when this was mentioned by Mr. Jennings, who urged immediate action in organising for 1934, the chairman was understood to say that the matter was under consideration.

A speech was delivered by Mr. J. W. J. Townley again this year on the much-discussed question of the proportion of subscriptions found by electricity supply undertakings and manufacturers respectively. He complained that whereas the representation on the Council was "fifty-fifty," the electricity supply authorities provided a much larger sum by way of subscriptions than the manufacturers. The subject is one on which much could be said from the standpoint of both sections, but it is sufficient to record here that Mr. H. C. Lamb, the new chairman, in a brief speech, said that as the result of long observation and experience he could say that he had never at any time found that the manufacturers endeavoured unduly to force their views upon the Council, which was a most harmonious body, but if there were any strong conflict of opinion due to any attitude on the part of the manufacturers' representatives, those representing the supply authorities would quickly make a move to secure reconstitution.

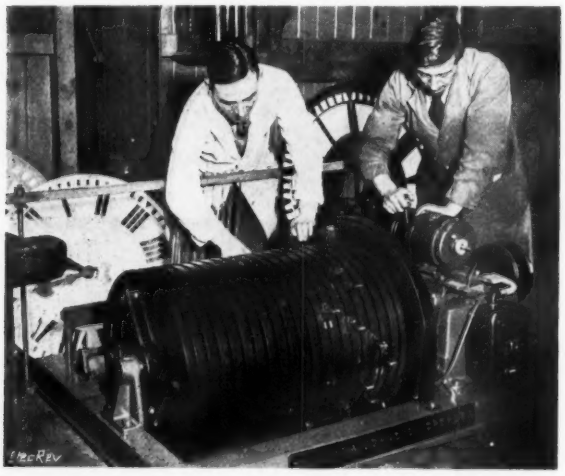
MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

What is Power Station Efficiency?

THE relative values of those factors that impose the present practical limits to power station efficiency are discussed in the paper which Mr. W. S. Burge read before the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 23rd. The author has endeavoured to avoid any dogmatic statements as to expected overall efficiencies with given steam conditions, because he is of the opinion that curves drawn to convey such information are of very little value.

He has therefore dealt with the subject from a different point of view. He introduces a method of analysis which



This clock, which will have four dials 11½ in. in diameter, is being made for the Southampton Civic Centre by Messrs. Gillett & Johnston. It embodies electrically driven mechanism which can be set to play various airs on the bells

gives full acknowledgment to the value of coincidence of plant-item efficiences and the grading of coincidence. A point of originality is that the author has dealt with the Rankine and regenerative cycles separately on the basis of their relative contributions to the total output of the station. He has done this for two reasons: first in order to give full significance to the higher cycle efficiency of the regenerative cycle, and, secondly, to afford the means whereby a standard form of power station efficiency rating can be arrived at. The present method of expressing a power station's efficiency in one final statement is criticised because it furnishes no clue as to the merit of the efficiency, and for this reason the author suggests a simple new form of efficiency rating.

He concludes that while there is still considerable room for improvement thermally, this can only be effected through coincident improvements in several directions. The best monthly efficiencies at present being obtained in this country are between 23 and 24 per cent. There is reasonable hope of realising between 27 and 28 per cent., which means an improvement of some 17 per cent. The scope for improvement should not, however, be gauged by comparison with our present best stations; if 20 per cent. is taken as representing the average thermal efficiency of our good stations, the scope for improvement amounts to some 37 per cent.

Is Reheating Worth While?

The realisation of monthly average efficiencies of 27 to 28 per cent. gives a rather fine choice between the combined Rankine and regenerative cycles, operating at the highest possible plant-item efficiency factors and with a limiting maximum temperature at the present time of 850 deg. F., and the combined reheating and regenerative cycles, operating at from 1,200 to 1,500 lb. per sq. in. and a maximum temperature of from 800 to 850 deg. F. There is little doubt that the reheating alternative is by far the more costly, and it is doubtful whether the operating difficulties and risks of such a scheme will be justified in the near future, the author states, in view of developments in the use of high-temperature steam without reheating.

With no extension of steam conditions beyond from 650 to 750 lb. per sq. in. and 850 deg. F., and without the use of re-superheating, there is still wide scope for progress by virtue of coincident improvement in plant-item efficiencies, full employment of the heat-return cycle, and improved operating conditions with regard to loading. The scope for efficiency gain due to higher steam pressures and temperatures is less than in any other direction, and it is probable that, for the time being, concentrated effort based on steam conditions of about 650 lb. per sq. in. and 850 deg. F. will produce the quickest and the best return on the capital invested.

The Plating of "Difficult" Metals

AFTER a lapse of several years the ELECTRODEPOSITORS' TECHNICAL SOCIETY has resumed its practice of arranging an annual provincial meeting by holding a conference in Birmingham. The subject under discussion was the very topical one of the electroplating of "difficult" metals, particularly aluminium and zinc base die castings. Two meetings were held and the Austin Motor Works at Longbridge were visited, where the chief item of interest was the large and well equipped electroplating department where the latest automatic plating plant was inspected.

A paper on "Practical Problems involved in the Commercial Electroplating of Aluminium," by Dr. H. K. Work, of the Aluminium Co. of America, evoked much interest. The paper was presented by Mr. H. Sutton, whose work on protective coatings for aluminium and its alloys is well known. A large number of the members present took part in the discussion, but it appeared that advantage is not as yet being taken in this country of the information available on this subject.

A paper by Mr. N. R. Laban was entitled "The Nickel Plating of Zinc Base Die Castings at High Current Density"; it described the methods successfully adopted in a large motor car works for the decoration of a considerable output of small components, such as car door handles and radiator caps, with a small plant and relatively unskilled labour. Another paper by Messrs. L. Wright and F. Taylor, on the "Plating of Zinc Base Die Castings" described the experiments of the authors in the direct nickel plating of the zinc casting alloys, which are finding increasing applications in the non-ferrous metal trades.

An important part of the conference was taken up by a discussion on the proposed formation of a local section of the Electrodepositors' Technical Society in Birmingham. It was resolved to call a meeting of Birmingham and district members to organise such a section and appoint a local committee.

Lighting Developments Abroad

PROGRESS in illuminating engineering abroad, excluding the United States, is reviewed in the paper which Dr. Ing. N. A. Halbertsma read before the ILLUMINATING ENGINEERING SOCIETY in London last week.

In the course of this the author says that we seem to be approaching a period of stabilisation. We have hitherto applied our physiological knowledge rather to avoid unfavourable conditions for seeing, than to create new and still better conditions than the best we thought we could realise. Even with "super-intensities" we tend to arrive at limits imposed by the imperfection of our present methods, which produce little light and much heat.

The gradual transition in the colour of the light of artificial incandescent sources towards the colour of daylight has been welcome. The hot-cathode luminous discharge lamp has brought a variety of new problems and it has also thrust the problem of the measurement and evaluation of heterochromatic light again before us. Is a new lamp having a considerably lower consumption likely to upset the sound financial basis of our tariff systems? The two-part tariff, which would suffer least from such a revolution in the field of illumination, has for this reason won the sympathy even of those electricity producers who had hitherto disliked a change in their old-fashioned flat-rate systems.

The illuminating engineer, however, should look at this matter from a broader angle of view. Any new source of light may either render other sources obsolete, or open new possibilities for the application of light which did not exist before. The illuminating engineer should especially welcome the gaseous lamp for this reason. There are many fields where it is relatively unimportant to distinguish colour but where visual acuity is of very great moment. Monochromatic light, as produced by a sodium lamp, has proved to be very useful in such cases, *e.g.*, for lighting main roads and enabling motor-car drivers to proceed at full speed without any headlights. Lighting such roads with incandescent sources would lead to

excessive cost without giving corresponding results, as one would neither profit by the absence of glare nor by the improved visual acuity, both of which are characteristics of monochromatic yellow light.

The development of luminous discharge lamps has been followed closely by those who are interested in the selection of colours for signalling purposes and for growing plants and flowers in countries where daylight is scarce in winter. The important effects of infra-red and other radiations are not always fully appreciated.

Induction Motor Theory and Operation

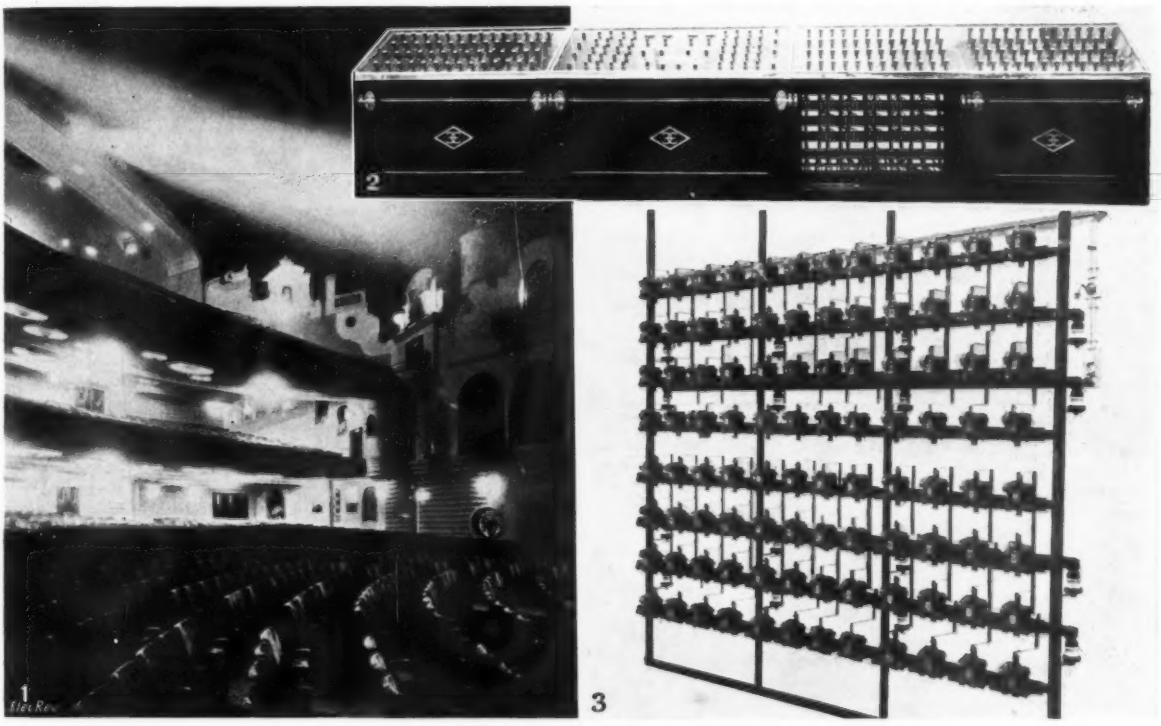
THREE public advanced lectures on the theory of the induction motor were recently delivered by Dr. F. T. Chapman at King's College, London. Oscillographic demonstrations were given of the e.m.f. in search coils, placed in the airgap of a motor and in the windings, to establish the existence of irregularities in the field of typical motors. The causes of these were stated to be the concentration of the windings in slotted cores, the slot openings, and the saturation of the iron. This departure of the actual field from the true sine shape has important practical results.

Having analysed the field harmonically Dr. Chapman showed that only the fundamental took any useful part in the work of the machine, and he suggested a definition of the dispersion coefficient of a polyphase winding as (total linkages per phase) ÷ (linkages per phase due to the fundamental field alone). A method of calculating this coefficient, which eliminates dubious calculations of " zig-zag " and " doubly linked " leakages was indicated. It was shown that one effect of saturation is that the total flux per pole is greater than the flux per pole due to the fundamental field, and so it loads up the stator and rotor cores.

The squirrel cage machine requires special treatment, since a cage winding (having a large number of bars) tends to wipe out the harmonic fields, and this tends to improve the power factor of the machine. Such windings, however, are liable to cause serious trouble from " crawling " and any alteration in the winding introduced to eliminate the tendency to crawl also removes the improvement in power factor. The crawling of a squirrel cage motor at 1/13 and 1/7 of its synchronous speed was demonstrated by Prof. Catterson-Smith, who made use of a tachometer placed in an epidiascope which projected an image of the scale on to a large screen.

Dr. Chapman emphasised the view that the higher study of the induction motor was mainly a study of the interesting, though complicated, magnetic circuit, and he ended with a brief discussion of the origin of hysteresis torque. The lectures were illustrated with cyclic films, specially prepared by Messrs. Dance-Kaufmann, which showed the movements of fundamental and higher components of fields due to stator and rotor currents.

In the discussion following the lectures it was pointed out by Prof. Catterson-Smith that the study of time and space variations of the gliding magnetic flux was of the utmost importance in connection with other forms of a.c. machines. He cited, among others, the case of anti-hunting grids fitted to salient-pole alternators and to synchronous motors driving variable torque loads. Diesel-driven alternator hunting could be cured only by the study of the fields in the air gap. The whole theory of armature reaction in alternators and rotaries was bound up in the theory of harmonic fields. Mr. D. B. Hoseason agreed with Dr. Chapman as to the importance of insulating the bars in squirrel-cage windings and, in support of this contention, exhibited slides showing oscillographic records of the greatly improved performance of rotors fitted with insulated cage windings. He also drew attention to the substantial reduction in the temperature rise of the windings, core, and cooling air in such cases, and to the improved acceleration of the motor. Mr. Hoseason described the homopolar generator equipment developed by the Metropolitan-Vickers Electrical Co., Ltd., for measuring the acceleration of rotors.



The Rex Cinema, Paris (See page 433)

1. A view of the interior. 2. The control panel for the stage and auditorium lighting. 3. A battery of small contactors

Supervisory Distant Control

SYSTEMS of supervisory remote control and distant indication are described in the paper which Mr. E. M. S. McWhirter read before the London Technical Group of the Electrical Power Engineers' Association last week. The systems considered were those developed by Standard Telephones & Cables, Ltd.

The selector method is based on selective telephone calling apparatus, is battery operated, and needs three pilot lines. It is particularly suitable when a small number of functions has to be performed, such as in railway track sub-stations. The distributor method requires four pilot lines, but is capable of performing fifty control operations, each on and off, and 100 indications of two-position devices. The impulse counting code constant-total rotary system was developed to provide metering facilities over the same pilot wires used for signalling over long distances with two pilot lines only, the sequence switches being power driven.

In opening a discussion on the paper Mr. J. R. Cowie, chairman, said that it was interesting to note how the relays of the centrovisory control were made part and parcel of the mechanical indicator diagram, or, in some other cases, an actual light diagram. Mr. H. S. Ripley said that telephony was definitely limited as regards distance, without the aid of voice-frequency apparatus. Where G.P.O. lines were used

the operations of maintenance men might result in the wrong operation of the control gear. The multitude of contacts and relays appeared to imply excessive maintenance costs.

Mr. McWhirter replied that the system was operating quite satisfactorily in the Mid-East England area over distances up to eighty miles. The G.P.O. line was a straight-through copper circuit, *i.e.*, there was no repeating or voice-frequency apparatus. Men testing the lines could interfere with a control operation or indication which might be in progress at the time, but with the constant total system they could not cause the apparatus to do anything wrong. Multitudinous contacts did not increase the danger unduly; there were safeguards.

Mr. A. Watson said that the apparatus was somewhat similar to the automatic telephone; the human element would enter into the system, but that should be avoided at all costs. Mr. C. G. White said that during the recent snowstorm in the Mid-East England area eight power lines came down, and the control system was called upon to deal with three, four, or five times the normal traffic density. In the control room one afternoon there were half a dozen Post Office maintenance men checking up the lines; within two minutes they had "butted in" on thirteen of the lines, but there were no wrong indications at all. Mr. McWhirter said that on the Great Indian Peninsula Railway there was a "Standard" equipment, and the amount spent on replacements since it was installed, early in 1930, was 24s., although the area in which it was used was dusty, and the maintenance work was in the hands of natives.

Mr. J. P. Morley was concerned about dependence upon the hiring of telephone lines, because the G.P.O. reserved the right to alter the route when it liked. Mr. McWhirter replied that the Post Office was bound to give its customers a guaranteed transmission quality, and if it suddenly jumped from a 2,000- to a 10,000-ohm line it would be rather outside the terms of contract, for speech would become almost unintelligible. Mr. A. G. Hilling's experience was that relays went wrong at the critical moment.

Various Views on Rural Distribution

IN the discussion that followed the reading of four papers (to which reference was made last week) at the monthly meeting of the OVERHEAD LINES ASSOCIATION in London on March 15th, the authors took part in commenting on each other's contributions.

Mr. W. Fennell did not think it wise to run overhead lines through winding streets in villages. They should be run behind, and then a fairly straight line could be maintained. In that case, the underground cable did not have a chance in competition. Mr. W. Turnbull, referring to the cost of £460 per mile at Chesham as compared with £320 at Aylesbury, said that Mr. Swan would be well advised to lean towards single phase. The services at Aylesbury were run in a similar manner to that described by Mr. Swan, but he used "Pernax" because he found that rubber-covered cable perished and cracked. Mr. H. W. Grimmitt said that if Mr. Swan could profitably electrify such small villages as he had referred to, there seemed no reason why every village in the country should not have a supply. The method of construction adopted in Chesham was in use in 75 per cent. of rural areas to-day and there was much to be said for it.

Mr. H. Wilson said that impedance had an important bearing on voltage drop. Owing to the increased distance between the conductors on an overhead line, a 0.06 underground cable was equivalent to a 0.075 overhead line for voltage-drop purposes. If the relative lives of overhead and underground cables were taken at fifteen and twenty-five years, respectively, the annual payments would be 7 and 10 per cent. If overhead line costs were 70 per cent. of the underground, the annual charges would be the same, but reduced maintenance charges would favour underground cable. He strongly deprecated the use of 5-kW or even 10-kW transformers. A modern cooker would take 7 kW and even a 15-kW transformer would be too small, whatever system were used, in view of the rapid development of the domestic load.

Overhead or Underground?

Mr. R. J. Swan said that a small overhead line could be used in the first place; it could easily be replaced by a larger one when the demand increased. It was very difficult to persuade a farm labourer to pay £5 for a service; it was better to get 50s. for an overhead service than lose a consumer. He had five cookers on a 5-kW transformer and, although it had been in for two years, there had been no trouble. Diversity enabled a small transformer to deal with a greater load than was thought possible by some people. Little money was derived from villages at the moment, but he believed the position would considerably improve. A scheme for hired wiring was now under consideration by his company.

Mr. R. B. Matthews suggested that the farmer should not be asked to spend more on single-phase motors so that the undertaking could spend less on the lines. It was better to adopt a three-phase system and encourage farmers to use more small motors rather than a few large ones. Mr. F. E. Rowlands said that the area north of Aylesbury, although almost completely electrified for two years, had only two motors connected. In the Bedford area of 126 square miles there were 2,000 motors out on hire and many others had been bought outright. A heat storage cooker had been developed which had a maximum demand of ½ kW, and already seventy were in use. For rural areas this had a great future. When a 0.2d. charge was made by the Central Board it would be possible to develop this type considerably.

A Reasonable Return is Essential

Mr. Turnbull said he did not offer farmers anything without any regard to cost. He believed that was the reason for the extraordinary development in the Bedford area. He was spending money where he could see some hope of a return, but not otherwise. As to the ¼-kW thermal storage cookers, seventy of them meant 35 kW, but he had 1,000 cookers in use with a maximum demand of about 40 kW over the peak.

Mr. W. H. Cooke said that in the Luton rural area he started with four-wire three-phase distribution, which was most suitable for the majority of the villages, but others were served on the single-phase system because that was the cheapest under their conditions. Provision had been made for a change-over to three-phase in future if required. He had not adopted small transformers because he had been astonished at the large amount of heating and cooking in the rural areas. There were overhead mains in his area that had been up for forty years and were still in good condition. There were also underground mains that had been in for thirty-five years. A 10-h.p. motor was as much as any farm required and then only for a few hours per annum. The biggest demand would be for lighting, heating and cooking, provided the supply was cheap enough. His experience suggested an all-in charge of ¾d. per kWh at most. Mr. C. F. Mounsdon referred to an underground system, used in an area of about 200 square miles, three-phase four-wire, with 3,500 V between phases and 2,000 V from phase to earth.

In dealing with Mr. Norris's paper, Messrs. Fennell, Grimmitt, and Turnbull all spoke of the advantages of the automatic voltage regulator.

Will Oil Switches be Superseded?

AN informal discussion at the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 13th on this subject was opened by Mr. J. W. Rissik, who exhibited lantern slides illustrating the construction and application of new types of oil-less breakers that are rapidly growing in favour in Germany and other parts of Europe. The air-blast switch embodies a motor-driven compressor or a cylinder of compressed air to provide a jet to blow out the arc at the parting contacts. In the water-break switch the interrupted contact draws an arc under water and generates steam, which, expanding, creates a gradually increasing water resistance and quenches the arc. There is also an oil-immersed breaker of such small dimensions as to be practically oil-less. In this type a contact is expelled at a very high speed through close fitting baffles in a long narrow cylinder of oil.

It was claimed that these new types embodied simplicity of mechanical construction, and avoided the outstanding and grave danger of fire and explosion of oil, and, of course, eliminated the use of enormous oil tanks. Mr. Rissik expressed the view that modern switchgear as exemplified in the grid sub-stations is wrongly designed, for each switchgear unit retains tons of oil to quench an arc that might be dealt with by a few quarts.

Mr. G. W. Partridge said that at Deptford, in 1892, he originated the oil-switch and his large experience brought him to the conclusion that there was no danger in breaking a contact under oil so long as there was a chamber to contain the operation. Compressed-air breakers were vulnerable; a tiny hole in the pipe or shroud would cause a breakdown. Any system which promised to reduce the enormous cost of switchgear must have most careful consideration.

* * *

Electricity from Refuse

The burning of general refuse for the production of electricity was a proposal advanced by Mr. H. Neaverson, Superintendent of the Huddersfield Transport and Cleansing Department, in a paper delivered before the recent Conference of the INSTITUTE OF PUBLIC CLEANSING. He said that even if only a quarter of the total energy available for the incineration of refuse were utilised in this way there would be a potential output of over 1,100,000,000 kWh of electricity, equivalent to a saving of about 1,000,000 tons of coal.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Non-productive Advertising

It is generally recognised that during recent years many electrical companies and electrical associations have adopted the fashion of publishing monthly and quarterly house organs. These publications are undoubtedly in the main intended for distribution amongst their personnel or members, as well as for circulation in a very limited sense amongst customers and likely customers in the local districts covered by the organisations in question. It is also fully recognised that the costs of these publications are in the main borne by the various manufacturers who are induced to contract for advertising space.

I understand that this very doubtful method of publicity has on many occasions been looked upon with somewhat sceptical eyes by discriminating manufacturers, who, while objecting to what is not only a profitless outlay but also an unnecessary burden, nevertheless for various obvious reasons feel compelled to give these house organs their financial support through the medium of advertising space. In addition, the charges imposed are usually at a rate which is out of all proportion to the value which, under any stretch of imagination, can possibly be derived from these publications.

Whereas these house organs are no doubt essential, and much appreciated by the personnel concerned, I feel that it is unreasonable that so many manufacturers should be expected to bear an excessive proportion of the cost of these publications. Is it not high time that the manufacturers were relieved of the numerous calls of this kind, which would help to ensure that the recognised percentage advertising outlay passed through the best channels for producing more trade?

OBJECTOR.

March 14th.

Assistance for Rural Development

The grid is now practically complete but the supply authorities are still reluctant to extend their mains to rural areas, and it seems, therefore, necessary to stimulate their energies in that direction. Two-thirds of the houses in this country are still unelectrified. The supply authorities state that an overhead line or main extended to a country district is not remunerative for two or three years and that any loss thereon must be reflected in the cost of electrical energy to the consumers in towns. The costs of electrical distribution are now at the minimum and if the work is not done at this stage it will cost very much more in years to come when the work will undoubtedly be carried out.

I would suggest, therefore, that the Treasury, which can borrow money at a cheap rate, should advance the necessary money for mains extensions to the supply undertakings upon special terms and that the interest demanded should be 1 per cent. for the first year, rising by ½ per cent. per annum up to, say, 5 per cent. The schemes would, of course, have to be approved by some central authority such as the Central Electricity Board or the Electricity Commissioners, and as the success of rural development scheme depends upon the use of electricity for all purposes, it should be a further condition that a suitable two-part tariff is available with the unit charge at something under 1d., and that the suppliers undertake an approved assisted wiring scheme and supply apparatus for hire on reasonable terms.

As the carrying out of such a scheme would necessitate orders for wiring, plant and machinery beyond the capital value covered by the loan, the Treasury should gain very much more by the reduction in unemployment "doles" than the difference in the interest which it would receive and pay.

Wimbledon Park, S.W.19, *March 16th*. C. W. DE ROEMER.

A Method of Solid Earthing

In your issue of January 20th, an article appears under the above title giving a description of an earthing system, which consists of a number of wrought iron pipes connected in parallel, and describing a method of measuring resistance to earth. I would point out that to obtain the maximum effect when connecting pipes in parallel, they should be spaced at a considerable distance apart, at least 10 ft. This is necessary if the resistance of two pipes in parallel is to be half that of a single pipe, as if the pipes are placed too close together, the resistance is higher than the calculated value for the number of pipes in parallel.

The method of measurement described is really the three-point method, although an audio-frequency bridge is employed for the measurement. The spacing employed for the two temporary connections is much too small to obtain accurate results, and for an earth connection of this type the distances should be at least 50 ft. and probably more. If the spacing is too small, the whole of the body of earth which contributes to the resistance of each of the earth connections is not included in the measurement, with the result that all the values obtained are too low. The true fall-of-potential method, in which the voltage drop across the earth connection under test only is measured in conjunction with the current, is a more satisfactory arrangement, and instruments working on this principle and giving a direct reading in ohms are available. These instruments enable any earth resistance to be measured quickly and accurately.

G. F. TAGG.

London, W.4, *March 15th*.

One of the new Diesel-electric trains in service on the P.L.M. Railway (See page 431)

A Complaint from Scotland

I was interested in the paragraph on page 358 of your issue of March 10th in which you refer to the complaint by Fife householders about not getting supplies of electricity. It is really high time some complaint was made about the extraordinary delays which are taking place in this area. A network of cables is being spread over south-east Fife, and current is actually being fed into these cables, but that is as far as one can get. Cables pass within a few hundred yards of towns, and these cables have for been "live" for months back. People are clamouring in the towns for supplies, have had their houses wired up for months, but not a single thing has been done, nor can any information be got as to when the supply is to be given.

In one town, a private line has been connected to a co-operative society, but except for this one building the rest of the

town has nothing. In another case, the cables are actually laid down through one street of the town, about six shops have been connected to this, but no effort has been made to spread the supply, although many places are wired. All over this district, the delays are worse than exasperating; even in towns where the cables are already laid it is frequently six weeks before a connection can be got though cable passes the door. No statement has been issued by the company operating in the area and no satisfaction is obtainable either by correspondence or personal calls. FIFE.

March 17th.

Neon Sign Connections

With reference to Mr. G. Bruce's letter in your issue of March 17th, I might refer him to the lecture recently delivered by Capt. C. Higgins on "Modern Electric Signs" under the auspices of the Association of Supervising Electrical Engineers. Capt. Higgins emphasised that breakdowns occur in high-voltage cables in conduit due to the corona discharge in the air space between the cable and the conduit; moreover, most cables are designed for a uniform potential distribution all around their cross-section, so that if an earthed conduit is brought into close contact with one portion of the cable, then this equipotential distribution is disturbed.

In my opinion the absurd restriction, which operates in a few boroughs, relating to the high-voltage wiring of neon signs, will soon be entirely removed. THOS. YOUNG.

London, E.4, *March 19th.*

Mr. Taunton and the National Register

I have read with interest Mr. T. C. Gilbert's review of Mr. H. R. Taunton's book "Electrical Contracting—Organisation and Routine" in your issue of March 3rd, and in particular that part of it relating to the National Register. Both the author and your contributor have apparently lost sight of, or perhaps they never knew the genesis of, the Register. It is true that the Board to which he refers consists of the nominees of the well-known institutions connected with the electrical industry. The constitution of the Register as it exists to-day received the considered approval of the Electrical Contractors' Association, and I understand that it conforms very closely to an early draft to which four past-presidents of the E.C.A. largely contributed. The primary and dominant object laid down in the constitution was and remains the protection of the public.

Mr. Taunton is quite accurate in stating that the contracting industry is represented on the Board by seven members. This number he describes as a "small minority." The founders, amongst whom was the Electrical Contractors' Association, came to the conclusion that that number was a fair and proper proportion, and no suggestion for a different proportion has ever been made by any responsible body. The author is further quoted as characterising as "nonsense" any argument that the Board as so constituted is necessary to inspire confidence in the public who would have no faith in a register controlled by the contractors themselves. But he omits to inform his readers who it is who put forward such a "nonsensical" argument. The Register never heard of it until Mr. Taunton proceeded to controvert it.

It has undoubtedly been the view of the various sections and so far as I am aware is still the view of the E.C.A. that the necessary "faith" of the industry as a whole is better secured by placing control in the hands of all the sections interested. There is no indication as to the manner in which other interests are presumed to hamper the operation of the Register or what difference in policy might be expected to result were it to be run solely by contractors. The author is credited with the dogmatic assertion that "only two parties have any interest in it [the Register], the public, theoretically, and the contractors, practically." Well, the public is a slow-moving animal and patient, but if the author and your contributor were a little more behind the scenes their view as to the degree to which other sections are interested would be materially modified, but be that as it may, and the constitution of the National Register being what it is, this "eclectic body of Olympians," as the author fancifully dubs the Board, feels, notwithstanding criticisms, that it has no option but to carry on in conformity with the obligations imposed by that constitution.

With regard to the first of the two main causes of what is alleged, and is admitted, to be the weakness of the National Register, namely, inadequate funds with which to advertise and carry out inspections. Advertising is a difficulty I need not dwell on. Lack of money is, alas! a cause of weakness in the operations of many worthy institutions as we all know, but this stigma may perhaps in part be so far withdrawn when I state that my Executive Committee has now seen its way to appoint a responsible and efficient person to carry out systematic inspections of installation work which it, as well as its critics, consider so essential. A. MONTGOMERY,

Secretary, National Register of Electrical
London, W.C.2, *March 20th.* Installation Contractors.

A Call to Action

The letter of "C.E.E." in your issue of March 17th has my hearty endorsement as the question of professional unemployment in the electrical industry is acute. With the rationalisation that has been occurring during these "seven lean years" many engineers, often those holding senior appointments, have been dispensed with and the feeling of insecurity has been transmitted to those remaining, which means that economies are practised, due to the fear of dismissal, thus widening the vicious habit of non-spending, already aggravated by the voracious demands of the tax-collector.

With the improvements in production that have been made, coupled with the economy campaign, it is only natural that staff employés, as well as workpeople, have had to be dispensed with; but in the former case the modern trend of specialisation makes it increasingly difficult to obtain employment; hence the need for sympathetic consideration, as a professional engineer could not have attained a position of responsibility without a foundation of sound principles and character, which surely can be utilised in some other section of the industry.

The suggestion of your correspondent for the formation of an Advisory and Employment Bureau is helpful. Is it too much to ask the Institution of Electrical Engineers to take the first step in this direction? The subject introduced by the president at the 149th informal meeting was "The Future Prospect for Electrical Engineers." I am prompted to write this letter as my family and I are at present suffering the misfortunes enumerated, through no fault of mine, after recovering from the time lost by 4½ years' war service, attaining a position of responsibility and building up a happy home.

March 17th. BM/DPGO.

I myself have been out for years and no one seems to do anything to help our cause. I have held appointments with firms of repute on cable laying and overhead line erection and installing all kinds of plants as superintendent engineer-in-charge. I have made applications for every kind of job without result, and I have no "dole." The men that are in posts don't worry too much about the fellow that is out. The people don't, or won't, regard unemployment with the effort that is needed to cure it. Action not talk is wanted.

It can be cured if only the competent powers would proceed with the necessary work. The railways should be electrified; every town has streets without mains; and the countryside will have the grid but no supply unless a bold scheme of electrification is proceeded with. All houses should be wired under assisted schemes or with prepayment meters. Let all corporations and companies get busy and the Central Electricity Board proceed with a large scheme. These bodies could easily raise all the money that they would require. It seems to me we want an electrical dictator with full powers to act.

To alleviate the present situation all who are in jobs and have reached an age when they can retire on pensions should do so at once. A pension fund might be built up out of profits and wages. T. W. T.

March 20th.

With reference to the letter of "C.E.E." in your issue of March 17th, we would like to draw your attention to the attached leaflet which gives particulars of this Society. As you will see, it has been formed by a group of unemployed men of executive capacity for the purpose of helping themselves and men of a similar type. Among our members there are quite a number of electrical engineers, and our Employment Bureau is actively approaching engineering firms for the purpose of getting them to recruit their staff from the Society.

As we have outgrown our present quarters, we are now arranging for increased office space, and as soon as this is available it is our intention to start a club-room where members can meet, write letters, consult copies of the daily papers, magazines, and technical journals, such as the ELECTRICAL REVIEW itself. Our activities for the time being are confined to London, but we have in mind the possibility of extending to some of the big provincial cities later on.

We shall be glad to welcome "C.E.E." and any other unemployed electrical engineers who care to give us a call at Room 52, 133, Oxford Street, W.1. WALDO MAAS,

Member of Management Committee,
British Executive Employment Society.

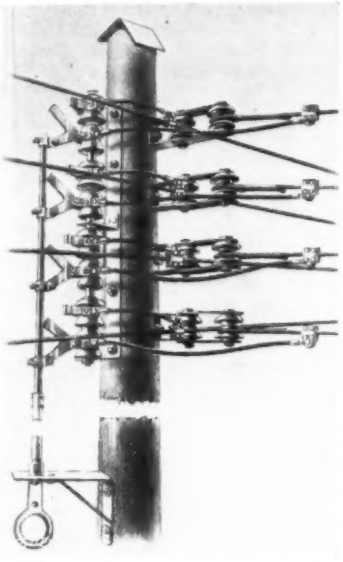
March 21st.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Rural Distribution

THE MACINTOSH CABLE CO., Derby, has recently introduced special cables and fittings for a low-voltage system of "under-the-eaves wiring." This system can be used in place of, or in conjunction with, the usual overhead distribution, the cost per mile including services being about the same as for pole line systems.



A vertical 4-pole switch controlling a branch line

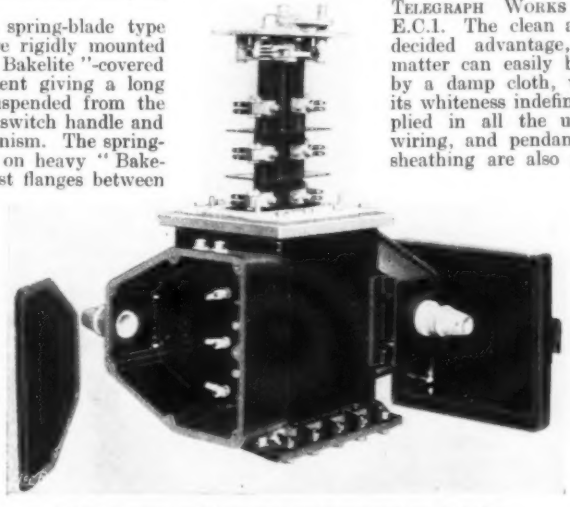
For use with this system of wiring the the Macintosh Co. has developed a new joint box for rapidly making the service connections.

A series of line and branch-line isolating switches have also been introduced, which may be applied in various ways for sectionalising and controlling lines and branches. The switches are designed so that they may be incorporated in the line construction at the pole, or else mounted upon the line pole near the branch. They can be arranged for operation by a detachable operating pole or by mechanism within reach of the ground, with provision for locking the switches in the "on" and "off" positions.

Oil-immersed Switch Fuses

The oil-immersed switch fuses developed by MESSRS. SWITCHGEAR & COWANS, LTD., Old Trafford, Manchester, are primarily intended for installing under pavements or roadways. They are made in single, two, and three-phase types for 3.3 kV and 11 kV, all with a current carrying capacity up to 100 A.

The movable contacts of the spring-blade type form the fuse carriers and are rigidly mounted between phase barriers on "Bakelite"-covered rods, the rotary switch movement giving a long double break. The whole is suspended from the top plate, which carries also the switch handle and the quick make-and-break mechanism. The spring-jaw fixed contacts are mounted on heavy "Bakelite" terminals moulded into cast flanges between the fabricated steel tank and the cable boxes into which they project. A diving-bell cover prevents the ingress of water into the switchgear. An interlock ensures the switch fuse being in the "off" position before the moving element can be withdrawn.



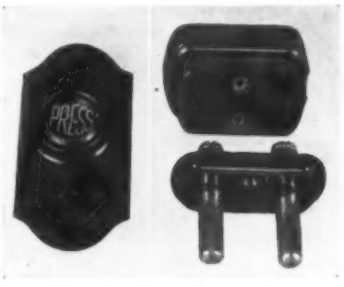
A Switchgear and Cowans oil-immersed switch fuse

A Two-part Tariff Indicator

A piece of apparatus for showing the effects of two tariffs has just been designed by Mr. D. J. Bolton, and was demonstrated at the Institution of Electrical Engineers recently. The indicator has a horizontal setting calibrated in £ per annum per kW and a vertical setting calibrated in pence per kWh. Both these settings can be adjusted over a wide range of values so that the indicator can be set up to show any particular two-part tariff of the usual type. The movable portion can then be turned to any desired load factor from 10 to 100 per cent. and the scale will show the overall price in pence per kWh. It will also show how this price is made up, *i.e.*, how much is on account of the fixed charge and how much the running charge. By the side of the load factor scale is another one, in red, showing hours of full-load working per week for a factory working a fifty-week year. Thus if such a factory works forty-eight hours a week and the mean load is three-quarters of the maximum this will be equivalent to thirty-six full-load hours a week, and by putting the indicator to this figure the overall price is shown. The indicator is intended for use by supply undertakings and others desirous of demonstrating the effect of any particular tariff or load factor. A model is available with both sets of scales duplicated so that two different tariffs can be demonstrated simultaneously. This is useful where alternative prices or schemes are in question. The same apparatus can be supplied for demonstrating domestic tariffs of the "all-in" type. The horizontal setting is then set to the fixed charge (*e.g.*, rateable value multiplied by fixed percentage) and the overall price can be read off for any given quarterly consumption. The indicator is obtainable from the A.B.C. DRAWING OFFICE REQUISITES, 63, Old Compton Street, W.1, for £5.

Two New Becker Products

The new Becker plug is neat, strong and well insulated; it is of the two-pin, 15-A type, and except for the two pins is all made of "Bakelite." The pins, which are secured in place independently of the terminal screws, are cross cut so as to give efficient contact in all circumstances. The cord entry is at the side of the plug to prevent pulling out, and the price is 10s. 6d. per dozen.



The Becker bell push and plug

The bell push is also made almost entirely of "Bakelite." The plunger remains firm when the bell is dismantled and, as it is slotted, it cannot turn or become loose. Contact is made by the rubbing between the metal bridge at the base of the plunger and the two phosphor-bronze contacts attached to the terminals. Guards round the terminals prevent any possibility of the leads "pulling away." The pushes retail at 8s. per dozen in black, brown, or mottled finish. Pure white finish costs 50 per cent. more. The plungers are made in a wide variety of colours with or without lettering, at no extra cost. Both products are made by MESSRS. GEORGE ECKER, LTD., Northend Road, Wembley, Middlesex.

White C.T.S. Cable

Interiors which are decorated in white often present problems to the contractor who has surface installations to carry out. For such situations a new white tough rubber sheathed cable has recently been introduced by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1. The clean appearance of this material is a decided advantage, and dust or other adhering matter can easily be removed from the sheathing by a damp cloth, while the sheathing will retain its whiteness indefinitely. These cables can be supplied in all the usual sizes suitable for interior wiring, and pendant cords with the new white sheathing are also available.

A Rubber Moulding Powder

Resin moulding powders have displaced much ebonite for insulating mouldings, but it seems that rubber may now be about to recover some of its lost ground in an unexpected manner. News reaches us that the GOODYEAR TYRE & RUBBER CO., of Akron, Ohio, U.S.A., has perfected a moulding powder, which it is calling "Plioform," made from pale crêpe rubber, which can be moulded in the same way as resin powders. It is manufactured by subjecting the rubber to chemical action while held in solution by a suitable solvent, which produces a white deposit that moulds to produce transparent articles. Although no details are yet available, it is said that the new compound has highly satisfactory insulating properties. It can be produced in all manner of colours, and has, it is claimed, many of the mechanical properties of the higher grades of the usual synthetic resins.

A New Front-entry Switch-plug

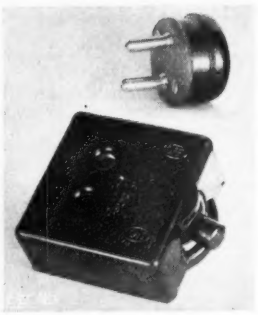
THE KERSONS MANUFACTURING CO., LTD., Kingsbury Road, Minworth, Birmingham, claims to have originated the deep recessed base which made it possible for B.E.S.A. handshield plugs to be used with side-entry switch sockets.

The size of these, however, was a great disadvantage, so the company has produced the "Dunlin" switch-plug, which is smaller than the normal 5-A surface switch yet embodies the heavy-duty switch action of the "Woodcock" and combines

with it B.S.S. sockets, housed under a " safety " shockproof cover only 2⅛ in. square, with ⅞ in. projection.

The design provides for front entry, permitting the use of any pattern plug-top, front connected terminals for rapid wiring, while the dolly is shielded by the body of the switch-socket, and cannot be inadvertently operated.

While arranged for mounting normally with the dolly on the right-hand side, the " Dunlin " can be supplied with the dolly on the left, at the top, or underneath. In any of these positions it is equally well protected, and accessibility in respect of inserting or pulling out the plug is not in any way impaired.



The " Dunlin " switch-plug

To facilitate wiring, front-connected terminals are fitted as standard, but where abnormally heavy cable is used a straight-through back-entry terminal can be provided. Square wooden blocks are available ready drilled for cables and pierced for fixing screws. These are not necessary when the switch-plug is mounted on the skirting, but will be found of value as a wireman's time-saver when wall mounting is necessary. The position " on " and " off " is stamped on the " Bakelite " cover, and the switch has a positive action. It is priced at 25s. 8d. a dozen in brown; with a white finish it costs 4s. a dozen more.

New " Swan " Screen Fire

Patterns Nos. 767 and 770 are recent additions to the range of screen fires supplied by MESSRS. BULPITT & SONS, LTD., 158, Camden Street, Birmingham.

A 3-kW " Swan " screen fire

The 2-kW model (No. 767) is 25 in. high and 26 in. wide, and is priced at £2 10s. The fire is fitted with a hinged panel attached by means of a special friction device to a pair of heavy " dog legs." It can be tilted at will, yet remains firm wherever set. The reflectors and surrounds are of chromium plate and the screen is finished in antique pewter. This model can be fitted with two 750-W elements if desired.

The 3-kW model, although differently shaped, is in the same finish and costs £3.

A Photo-cell for Light Measurement

All methods of estimating the luminous efficiency of an incandescent filament lamp are based on photo-electric measurements. The optical photometer possesses several disadvantages; it is not easily transportable and requires the personal discrimination of the operator. The photometer incorporating a photo-electric cell is much easier to handle and much more accurate. It consists mainly of a photometer compartment divided into two equal parts, a photo-electric cell and an amplifying valve, in the plate circuit of which a measuring instrument is incorporated, indicating the luminous output value.

When the cell is included in an electric circuit incorporating the measuring instrument, the needle will fluctuate in accordance with the amount of light which falls on the cathode (usually consisting of a thin layer of potassium or caesium). The current thus obtained is extremely small and is amplified before measurement. The current of the photo-electric cell is applied to the grid of a steep-slope triode, and the amplified plate current operates the needle of a standard type milliammeter.

The portable photometer used by PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, incorporates a Philips 3510 vacuum photo-electric cell, the sensitivity of which is 3 A per lumen at 120 V. The maximum photo-electric effect is obtained at 5,400 angström. A " Miniwatt E.424 " indirectly heated amplifying valve with a slope of 3 mA per V (amplification factor 24) is used.

The photometer is made for operation on either a.c. or d.c. The voltage applied to the valve is kept constant at 120 V and 20 mA by means of a regulator lamp. A milliammeter indicates the luminous output in percentages.

The light falling on the photo-electric cell is regulated by an ordinary diaphragm, and the amplified current can be controlled by a potentiometer which modifies the polarisation of the grid. These two components make it possible to keep within the registering limits of the apparatus when testing lamps of high intensity.

" Magnet " Soldering Irons

New soldering irons are being introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, to replace the standard patterns; these are approximately of the same weight and loading (300 W) as the old. The practical tests which have been carried out on these irons have proved satisfactory, and it can be assumed that they will have a longer life. Another feature is the improved method of fixing the handle to the body, keeping the handle cool, and avoiding excessive temperature after prolonged operation. The prices are lower, the medium type costing 36s., and the heavy type 40s., as against 40s. and 44s. respectively.

A Master Frequency Clock for Power Stations

The accurate maintenance of frequency necessary with modern a.c. distribution has led to power stations being equipped with special master clocks designed to enable the cycles to be periodically checked by comparison with Greenwich time, a method which ensures that any small adjustments can be made with ease and accuracy.

Amongst the most interesting of these clocks is the Smith-Synchronome master frequency controller made by SMITH'S ENGLISH CLOCKS, LTD., 179, Great Portland Street, W.1, which was briefly mentioned in our issue of August 19th last, page 255. This is an ingenious combination of a Synchronome master-clock, a frequency-driven electric timepiece, and a radio receiver.

The Smith-Synchronome master frequency clock

The Greenwich time portion of the controller consists of a standard half-minute master timepiece having a seconds pendulum, and it is fitted with additional mechanism for the transmission of seconds impulses in addition to the usual half-minute impulses. These seconds impulses operate the hand of the lower of the two large dials mounted on the front of the clock case, and the other half-minute impulses actuate the small dial, indicating hours and minutes, which can be seen on the oblong panel below the seconds dial. The other large dial at the top of the case is operated by a synchronous-motor clock movement, which is in circuit with the current generated at the power station. It thus indicates seconds in " frequency-time," while the corresponding hours and minutes of " frequency-time " are shown by the right-hand dial on the small oblong panel, this dial being also driven by a synchronous motor.

In operation the Greenwich time master clock advances the hand of the large seconds dial second by second and those of the smaller ones in half-minute steps. Simultaneously the hands of the two dials which show " frequency-time " are being advanced by their respective motors in step with the cycles of the alternating current. Immediately any error of frequency occurs the discrepancy between the dial readings will not only draw attention to the fact, but will also indicate the amount of adjustment necessary for correction.

Two views of the Philips photometer

The accuracy of the master clock to Greenwich time is maintained by comparison with the time signals broadcast by the B.B.C. These are received by the radio receiver situated in the base of the clock case and are communicated to the engineer in charge by means of a loud speaker in the case.

By a printer's error the word " batteries " was substituted for " laboratories " in our note last week on a new sodium lamp produced by Philips Industrial.

Electrical Progress in South Africa. By E. Poole (Durban)

THE attention given in the daily Press of late regarding South Africa's abandonment of the gold standard, with its consequent political upheaval and the boom in the gold mining market, naturally turns one's thoughts to the way in which the electrical position may be affected by the general improvement in trade economic conditions which may be expected. Big funds are now returning to South Africa, so that the Union should now trade on a more competitive basis with the rest of the world, and this should attract still further fresh capital for the exploitation and development of the latent resources of that great country, although a full return to prosperity can hardly be hoped for until the present world depression is ended.

That electricity should go ahead with the progress of the country goes without saying. Development has proceeded so satisfactorily during the past two years' slump that electrical progress should be greatly stimulated by the improvement in the financial position. The growth of the domestic electrical business among the municipalities has been very marked, and is well worthy of examination; the domestic side has more than counterbalanced the fall on the industrial branch for which the slump was responsible.

It is naturally in the larger towns that progress is most marked, though many of the smaller towns have made proportionately good progress in the same direction. The example given by Durban in its domestic campaign has found quite a number of followers, and the larger cities of Johannesburg and Cape Town are rapidly increasing their sales of energy; the former city has now taken away from Durban the honour it has held for a year or so of having the largest output among the municipalities of the Union.

There were a total of 141 municipal electrical undertakings in the country in 1930, while to-day there are 153, and there are no cities and few townships which do not now run their own electrical undertaking, and the output has risen from a total of approximately 350 million to 450 million during that period. The following table may be of interest in showing the progress made during the past two years in the five principal towns.—

Town.	1930.				1932.			
		Apparatus Installed.				Apparatus Installed.		
	Kwh sold (millions.)	Stoves.	Water Heaters.	Refrigerators.	Kwh sold (millions.)	Stoves.	Water Heaters.	Refrigerators.
Durban	90.5	7,475	4,929	922	100.4	9,769	5,939	2,068
Cape Town	58.8	200	859	*	78.7	4,247	1,013	500 approx.
Johannesburg ...	82.6	760	75	*	103.4	2,745	124	*
Pretoria	27.6	997	375	143	37.9	1,800	412	*
Port Elizabeth ...	8.6	340	150	*	24.2	900	*	220

*Figures not available.

Durban for some time had the lowest secondary rate—$\frac{1}{2}$d. per kWh, less 10 per cent. for its domestic tariff—but of late Cape Town has introduced a $\frac{1}{4}$d. rate; Port Elizabeth has a charge of $\frac{1}{2}$d., less 5 per cent.; Johannesburg one of $\frac{3}{4}$d.; Pretoria has a sliding scale from 2d. to $\frac{1}{2}$d., while many other smaller towns are down to 1d., with a rapid growth of consumption all round. Durban's consumption for heating and cooking alone for the past year amounted to 43 per cent. of the total sold, while during the past two years Cape Town's domestic load has increased by 200 per cent., the amount sold for domestic purposes being 38 per cent. of the total. During the past ten years the undertaking's revenue has doubled in spite of charges having been substantially reduced five or six times. Again, Pretoria's demand for domestic energy works out at 30 per cent. of the total sold.

Low tariffs alone have not been responsible for the increased consumption, the introduction of easy-payment schemes for the purchase of appliances has assisted considerably, and large amounts have been expended in this direction.

The electrical showroom building at Wynberg, Cape Town

Durban has advanced over £150,000 for appliances, of which no less than £9,000 fell into the first half of 1932 for refrigerators alone, the popular size being of 5 cu. ft.; these are sold locally at from £40 to £55 each. American makes have become very popular, and there would appear to be a good market in this direction for British manufacturers. Cape Town has advanced £145,000 since it launched its easy-payment scheme some two years ago, while Pretoria has expended £41,341 and Johannesburg £46,250 during the same period; Port Elizabeth is about to introduce a similar scheme.

Much propaganda work has been carried out by advertising, exhibitions, competitions, &c., as well as by the establishment of showrooms in several instances—Cape Town being outstanding in this respect with no fewer than four large establishments in various parts of the city and the suburban area.

The total capital spent in the whole of the South African municipal electrical undertakings is approximately £14,000,000, the amount spent by the five larger towns being as follows:—Johannesburg, £2,786,878; Cape Town, £2,863,842; Durban, £1,744,000; Pretoria, £1,143,541; and Port Elizabeth, £862,961.

In addition to the municipal undertakings with which this article particularly deals there are, of course, the very large undertakings of the Victoria Falls Co. supplying a number of municipalities in bulk as well as the Rand gold mines, and there are also the large power stations of the Electricity Supply Commission at Colenso, Congella, and Salt River (Cape Town), which are supplying a large number of municipalities as well as the S.A. Railways for electrification and other demands.

The Domestic Appliance Market

A RECENTLY issued Department of Overseas Trade report refers to the steady progress in the demand for electricity and says that there is some competition from gas, but generally speaking it is considered that the price of gas for domestic purposes is high as compared with that of electricity. In Durban electricity is the sole method of domestic lighting and heating, except in the case of a few of the older houses, and there is no gas installation in the town.

Generally speaking there is a tendency to "Buy British" whenever possible, sentiment often overruling a price advantage. Advertising of a general nature might be undertaken by factory representatives, but, with the exception of cookers and refrigerators, few other electrical appliances are advertised in the Press. The municipalities are doing a great deal to encourage the use of electricity.

Electrical domestic appliances are not separately classified in the official import statistics, but the trade returns include a general heading "Electrical heating and cooking apparatus." This shows that the value of such imports in 1928 was £118,358, and in 1931 £220,420. Canada secures the largest share of the trade; in 1928 the imports from this source amounted to £44,231, or 37.4 per cent., and in 1931 £78,579 or 35.7 per cent. The United Kingdom ranks second, with totals of £38,018 and £60,588 respectively, the United States coming third (£18,499 and £35,665), and Germany fourth (£13,338 and £15,713).

With the exception of a few firms who assemble water heaters there are no concerns in the Union as yet actually manufacturing domestic appliances. It is reported, however, that a firm in Natal is about to install the necessary plant for the manufacture of cookers, and that production will commence within a few months. There is evidence that electricity is superseding other forms of power and there have been good sales, particularly of the smaller appliances such as irons, kettles, toasters, &c. The sale is mainly in the hands of ironmongers, branches of overseas manufacturers and electrical contractors.

Competition is so keen among cooker manufacturers that

only the most modern types are saleable. Both the high oven type, mounted on a pedestal, and the low oven, or cabinet type, are in demand. It is stated that the wiring of English cookers is of a high standard, but that the "mottle" finish on most cookers imported from the United Kingdom is not popular, a porcelain finish being the most acceptable. If United Kingdom manufacturers would produce cookers having the appearance and capabilities of those produced in Canada and the United States, and if those manufacturers were efficiently represented in the market, there would be a good demand for the English-made cooker.

The bulk of the trade in refrigerators is in the hands of American manufacturers, but an efficient English refrigerator, at a competitive price would find a ready sale. There is not a large market for vacuum cleaners, while the demand for water-heaters (except in Cape Town) and for washing machines is small. There is a good demand for the smaller appliances such as kettles, irons, coffee percolators, electric radiators and fires, and, except in the case of coffee percolators, the bulk of which are provided by Germany, America and Canada, a large share of the trade goes to the United Kingdom. This trade, however, is divided among a large number of retailers, and there is a tendency for the retailers to buy in the cheapest market, a policy which favours German manufacturers.

Broadly speaking, two methods of marketing domestic electric equipment seem to be used in the Union, *i.e*, factory representation and indent agent. The factory representative is usually appointed by manufacturers of cookers and refrigerators; he is given power to appoint stockists or distributors throughout the country, to arrange for advertising of a general nature and generally to supervise the business of his principals.

The indent agent does not confine himself to one dealer in each town, but displays his samples and books orders from all dealers. This type of agent is usually employed for the smaller domestic appliances. Vacuum cleaners are usually marketed in a specialised manner, and representation appears to be placed with firms who employ demonstrators, and are able to arrange for a house-to-house canvass.

In the Courts

AT the Bow Street Police Court on March 17th, John E. Ferguson and Sidney Welch, directors of James Ferguson, Ltd., Merton Abbey, S.W., were summoned for corruptly making gifts to an employé of Bakelite, Ltd., with a view to obtaining information regarding the manufacture of "Bakelite." The employé, Alfred J. Buck, a chemist, was charged with receiving these gifts.

Mr. Roland Oliver, K.C., prosecuting, said that Bakelite, Ltd., produced a powder from which various kinds of mouldings were made. In 1928 a similar powder appeared on the market, and it was discovered that Ferguson and Welch had made payments to Buck for the disclosure of his company's secret formula, in breach of an agreement which he had with the company. Upon police interrogation Buck made a full voluntary statement regarding the matter. The prosecution was not asking for costs as Ferguson's solicitors had undertaken to meet the expenses of the prosecution.

On behalf of Ferguson, Sir Patrick Hastings, K.C., said that the offence really occurred in 1927 when his client was only twenty-three years of age. As a young man in a responsible position he did not realise the seriousness of the matter, and in fact might even have thought it clever.

For Welch and Buck, Sir Henry Curtis Bennett, K.C., said that although nominally a director Welch was really an employé of the company. When Buck sold the formula he was rather low financially.

The magistrate (Mr. R. Graham-Campbell) imposed fines of £300 (or three months' imprisonment) on Ferguson; £150 (or two months' imprisonment) on Welch; and £60 (or one month's imprisonment) on Buck. He said that in giving the defendants the option of paying fines he took into consideration the fact that the offence was committed some time ago when they were younger men.

Rating Appeal by the City Company

An appeal against a decision of the Southwark Assessment Committee, by the City of London Electric Light Co., Ltd., was heard at the London Sessions on Friday last week. Counsel for the applicants said the appeal related to a substation which was erected in Southwark in 1931. The Committee assessed the premises at £1,150 gross value, and £575 rateable value, and the applicants contended the figures should be reduced to £300 and £50 respectively. In 1930 the applicant's electricity undertaking was valued in the ordinary way, and the profits assessed on the whole part of the undertaking supplying current in the City of London, and part in Southwark. It was assessed by taking the gross receipts and subtracting the working expenses, and that gave the net revenue. It was necessary to apportion the value between the two parishes. When the new building was erected it was an integral part of the system, and could not be treated as a separate building with a separate value. Although a building of considerable size and costing a large amount of money, it was useless on its own.

The Assessment Committee said that it was a new building and should be valued structurally on the contractors' basis. Counsel contended that this was wrong, as the sub-station had no value as a separate hereditament, and should be assessed on the profit basis. There had been no substantial increase in the profits of the company by reason of the erection of the sub-station. It was erected in order to transform current at 10,000 V down to consumers' voltage instead of distributing at low voltage from the company's generating station situated at Bankside.

Mr. Trustram Eve, for the Assessment Committee, submitted there was no case to answer. It was impossible, he submitted, to value this building as otherwise than a separate hereditament. Sir Herbert Wilberforce (chairman) upheld the contention, and the appeal was dismissed with costs.

A Belgian Company's Bond Interest

In October last Mr. Josiah Feist, a holder of bonds in the Société Intercommunale Belge d'Electricité, sought a declaration that the interest on these bonds should be paid in sterling at the rate of exchange prevailing on September 1st, 1928. Mr. Justice Farwell ruled that payment could be made in whatever happened to be legal tender at the time when the amounts became due.

Mr. Feist appealed against this decision on March 17th, but the Court of Appeal, consisting of the Master of the Rolls, Lord Justice Lawrence, and Lord Justice Romer, confirmed the judge's decision and dismissed the appeal.

The Eastbourne Contracts

As the result of the private inquiry held in November last into certain alleged irregularities with regard to electrical contracts, and following a meeting of the Eastbourne Corporation held on December 5th (ELEC. REV., December 9th, p. 859), it is reported in the daily Press that summonses have been served at the instance of the Director of Public Prosecutions on ex-Ald. R. S. Chatfield, a former chairman of the Eastbourne Electricity Committee, Mr. D. H. A. Roberts, late assistant electrical engineer, a third person, and the Pirelli-General Cable Works, Ltd. The summonses are returnable on April 4th.

The Protection of High-voltage Lines

THE original interconnecting system of the Indianapolis Power & Light Co. throughout the city consisted of 33-kV lines. A 138-kV ring main has been erected completely round this network to feed it *via* step-down transformer sub-stations. The bulk of the supply is generated in the 73,500-kW Harding St. Station, and switching is carried out at 138 kV. According to the *Electrical Journal*, precautions against lightning hazards include the shielding of all h.v. sub-stations and lines with earth wires, over-insulation of lines and busbars, maintenance of liberal spacings from phase wires to earth wires and to earthed structures, installation of autovalve lightning arrestors at all sub-stations and low earth resistance at sub-stations and at tower footings. For the double-circuit towers between Harding St. power station and the Northwest sub-station two earth wires are installed, but elsewhere one only.

At Harding Street a neutral reactor limits the system disturbance for single line to earth faults, and the neutrals of the transformers are fully insulated. The De-ion grid, 138-kV, 1,500,000-kVA interrupting capacity circuit breakers are normally rated at twelve cycles, but will operate in nine cycles for maximum capacity faults (that is, when all generators and all lines are in service), and in ten cycles for maximum capacity faults—about 12 per cent. of the rated interrupting capacity. These times are measured from the energising of the shunt trip coil to the extinction of the arc, and are about one-third of those to be expected with the slower speed breaking equipment. Condenser bushing potential devices provide a source of voltage for relaying, synchronising, and voltage indication, resulting in an appreciable saving in space and cost. Bushing-type current transformers are used throughout for relaying. On account of the importance of quick clearing of faults, the small relative additional cost was incurred of installing high-speed relays wherever possible, supplemented with induction relays. High-speed current relays are used for tripping the first line where there are short parallel lines between sub-stations.

The 600 short-circuit tests made equalled many years of ordinary service and apparently proved the circuit breakers to be little affected and to open with negligible system disturbance. During sixteen months of commercial operation there have been several severe lightning storms. During one storm there were twenty-three 33-kV and forty-three 4-kV switch operations, but the 138-kV system was unaffected.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Metro-Vick Arrests in Moscow

Questions relating to the arrest of employés of the Metropolitan-Vickers Electrical Co., Ltd., in Moscow have been raised in the House of Commons during the past few days. Referring to information received from H.M. Ambassador at Moscow, Mr. Stanley Baldwin stated that confirmation had been received of the Press reports that Messrs. Monkhouse, Thornton, Cushny, MacDonald, Gregory, and Nordwall, of the Metrovick Co., together with twenty Soviet citizens employed by the same company, had been arrested on a charge of sabotage of electrical machinery. Messrs. Monkhouse and Nordwall had since been provisionally released on an undertaking not to leave Moscow, but the other persons were still in custody. With regard to the legal steps for the defence of the prisoners, Mr. Eden said that the Soviet Government had stated that the prisoners would not be allowed to avail themselves of the services of British counsel, nor would such counsel be allowed to be present in Court during the trial, the only counsel allowed in such cases being nominated from the Soviet College of Jurisconsults. Sir Esmond Ovey had been instructed to press for untrammelled legal assistance for the prisoners if a trial was held.

Regarding a Riga message that the alleged offence is that the blades of the turbines at the Dnieprostroi Dam have been corroded with malicious intent, the Metrovick Co. states that there can be no truth in this statement, for the reason that the company supplied none of the turbines and generators in question, nor any of the materials used in their construction. The turbines were actually supplied from America. Moreover, the idea of damaging these huge turbines by pouring in sand or acid is manifestly absurd. Each blade used in these machines weighs about 5 tons, and millions of gallons of water pass through the turbines daily, which would prevent any acid or sand remaining in them. The statement that the charge against the arrested men is of such a nature, therefore, is fantastic. The company is still confident that the whole affair is a mistake, and that its employés under arrest ought to be released at once.

In view of the arrests the Government has decided to suspend negotiations with the Soviet Government for a commercial treaty.

Contractors and Regulations

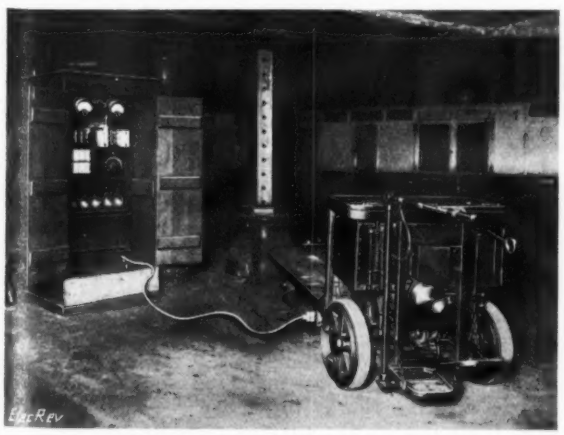
An address was given at the Electricity Showrooms, Hove, on March 14th, by Mr. F. C. Raphael to members of the Hove E.D.A. Circle. Mr. Raphael said that contractors, when tendering for work, should study the supply authority's conditions of supply and wiring rules, as contracts usually provided that installations should be carried out to comply with these regulations. Contractors should also state clearly the materials they proposed to use. The observance of these two points would go a long way towards avoiding litigation.

The E.D.A. Public Speaking Competition

The National Finals in the British Electrical Development Association's Public Speaking Competition will take the place of the ordinary Salesmanship Conference at the Caxton Hall, Westminster, to-day (Friday) at 7 p.m.

"Tungar" Battery Charging

It is about ten years since "Tungar" battery charging equipment was first manufactured in this country. The

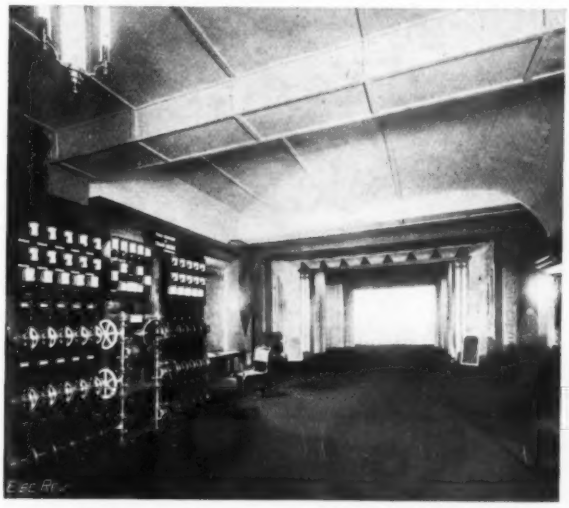


"Tungar" equipment in use at Paddington Station for charging truck batteries

absence of moving parts, which is this valve rectifier's principal feature, has conferred upon it an unusual elasticity of application. About nine years ago the G.P.O. standardised "Tungars" for special applications, and since then has continued to use them in increasing numbers. The first large "Tungar" used in this country was that installed about eight years ago at Paddington Station, G.W.R., for charging electric truck batteries. This rectifier has been in constant use since then, and another has just been installed beside it to extend charging facilities.

Stage-lighting Demonstrations

To enable stage and cinema lighting effects to be demonstrated and studied before or during actual production, the Strand Electrical & Engineering Co., Ltd., has opened the



The new Seecol Theatre, where theatrical and film producers can see all the latest lighting effects

Seecol Theatre at its premises at 28, Floral Street, W.C.2. Here may be seen, without any expense to the theatrical or stage producer, all the latest colour lighting devices for the stage, and, as our illustration shows, the switchboard is in a prominent position in the body of the theatre so that visitors may observe the simplicity with which the various effects are produced. The theatre was officially opened by Mr. C. B. Cochran last Friday.

The Marking of Imported Electrical Accessories

The Standing Committee appointed by the Board of Trade will hold an inquiry on April 10th and 11th as to whether the following imported electrical accessories should be required to bear an indication of origin: Lampholders, switches of up to and including 30 A, ceiling roses, cut outs and fuses of up to and including 30 A, wall sockets and plugs and plug adaptors of up to and including 30 A, plugs and/or sockets for use as connectors of up to and including 30 A, adaptors for lampholders, and switchplates. The inquiry will be held at the Board of Trade Offices, Great George Street, S.W.1. Communications should be addressed to the secretary, Mr. E. W. Reardon, at that address.

The British Plastic Moulding Trade Association

H.R.H. Prince George was to be the principal guest at the annual trade luncheon held by the British Plastic Moulding Trade Association at the Savoy Hotel yesterday.

The New Hull Showrooms

Several examples of Holophane lighting are to be seen at the new showrooms of the Hull Corporation Electricity Department, the opening of which was reported in our last issue. Of particular interest is the installation of a three-colour lighting system in the domed ceiling of the main hall. "Hedralite" fittings of various types have been provided for the main staircases and other parts of the building, while the entrance lobby is illuminated in a novel manner by a large solid copper laylight.

The French Electrical Industry

The Union des Syndicats de l'Electricité, combining groups representing electrical manufacturers and contractors and supply authorities, has just issued its yearly report, which records the first work carried out by its new Commission organisation. Two brochures which deal with every branch of the electrical industry, and which are taken as authoritative by those in the industry, have been thoroughly revised, and other publications are to be rewritten which relate to various apparatus, such as motors, transformers, generators, &c.—in fact the work of the Union will be to bring these publications into line with the results obtained by the International Commission. One of the most important subjects now being

considered deals with a demand recently received from the Minister of Public Works that apparatus should be employed on all power lines which would render them harmless in the event of a breakdown. Another matter receiving attention is the propaganda, marketing, and general handling of certain "marked" and high-class apparatus.

Australian Tariff Revisions

The *Board of Trade Journal* publishes particulars of the revisions which the Australian Government has made in its Customs tariff; these alterations operate as from March 9th. The new *ad valorem* duties are as follows:—

	British Preferential Tariff. Per cent.	General Tariff. Per cent.
179. Electrical machines and appliances:—		
(B) Electrical fittings consisting wholly or partly of metal (switches, fuses, and lightning arrestors, n.e.i.)	45	65
(C) Regulating, storing and controlling apparatus for all electrical purposes, including distributing and switchboards, n.e.i. ...	45	65
(D) (2) Static transformers above 66,000 V:—		
(1) Less than 50 kVA....	45	65
(3) (a) Electric fans	15	40
(F) Ironclad or moulded fuses, switches airbreak switches and fuses combined ...	45	65

There is no change in the duties on a.c. and d.c. dynamo-electric machines or on transformers generally. Reductions have been made in the duties on radio receivers, parts and accessories.

Electric Cooking in Working-class Houses

The satisfaction given by electric cooking in working-class houses is well demonstrated in a pamphlet just issued by the Harrogate Electricity Department, containing testimonials received from tenants on Corporation housing estates. The publication sets forth the advantages of the all-in tariff, with examples of what domestic services a "unit" can be made to do.

Old Cromptonians' Dinner

The annual dinner of the Association of Old Cromptonians will be held at the Hotel Victoria, Northumberland Avenue, London, on May 5th. Colonel Crompton will preside. Tickets may be obtained from Mr. H. H. Spencer, of Messrs. Crompton Parkinson, Ltd., Bush House, W.C.2.

India's Electrical Import Trade

According to a survey published by the Department of Overseas Trade, imports of electrical machinery into India during the nine months ended December last amounted to Rs. 1?2½ lakhs, a decrease of Rs. 29¼ lakhs as compared with the corresponding period of 1931. The total imports of electrical (including telegraph) instruments, apparatus, appliances, and parts increased from Rs. 172 lakhs to Rs. 174, the United Kingdom's share rising from Rs. 86 lakhs to Rs. 90 lakhs. Purchases of fans totalled Rs. 15¾ lakhs as compared with Rs. 11¾ lakhs (U.K.'s share Rs. 9¼ lakhs, against Rs. 7½ lakhs), while under the heading of electric wires and cables (rubber-insulated) there was a reduction in the total trade from Rs. 21 lakhs to Rs 18¼ lakhs (U.K 's share Rs. 12¾ lakhs, against Rs. 13¾ lakhs). In the case of electric wires and cables (insulation other than rubber), the United Kingdom supplied Rs. 16¼ lakhs out of Rs. 17½ lakhs, as compared with Rs. 13 lakhs out of Rs. 15½ lakhs. Although lamp imports declined from Rs. 24¾ lakhs to Rs. 23 lakhs, there was an increase in the United Kingdom's share from Rs. 9½ lakhs to Rs. 10 lakhs.

For Sale

Mr. George R. Lightfoot is to sell by auction at 13, High Holborn, W.C.1, a stock of electrical and wireless goods.

Two 1,000-kW turbo-generators with condensers and auxiliary plant are offered for sale by the Bournemouth and Poole Electricity Supply Co., Ltd.

On April 6th the West Central Merchandise Mart is to sell by auction electrical goods of all descriptions at Torrens Street, Islington.

Rotary convertors are offered for sale by the Westminster Electric Supply Corporation, Ltd.

Ilkley Urban District Council offers plant for sale.

(See our classified advertisements.)

Local Exhibitions

Electricity plays an important part in the Dumfries Traders' Exhibition opened on March 17th. The principal feature is an all-electric house, which has attracted much attention due to the fact that within a short time electricity will be available everywhere throughout Dumfriesshire and Galloway. Among the exhibitors are British Insulated Cables, Ltd., the General Electric Co., Ltd., Callender's Cable and Construction Co., Ltd., the Craigpark Electric Cable Co., Ltd., and local contractors.

The Scottish Southern Electric Co., Ltd., recently held an exhibition of electrical appliances and fittings at Earlston.

Employment During February

According to the *Ministry of Labour Gazette* employment during February in the engineering industry as a whole showed comparatively little change, and remained bad. The total out of work numbered 269,697, against 269 267 in January, the percentage rising from 18.2 to 19.4. Employment was also very slack generally in electrical engineering, and the number of unemployed increased from 17,459 to 18,132 (from 18.6 to 19.3 per cent.). There were increases in the numbers out of work both in the electric cable, wire and lamp manufacturing group from 19.214 to 21,382 (16.4 to 18.2 per cent.), and in the electrical wiring and contracting industry from 4,687 to 4,841 (18.7 to 19.3 per cent.).

Recent Contract

The Netherland Steamship Co. has ordered from Messrs. Crossley Bros., Ltd., auxiliary Diesels for the cargo liners *Manoeran*, *Madoera* and *Mapia*. The engines are of the two-cycle single-acting trunk piston type, with separate scavenge air pump and forced lubrication, and are connected to 65-kW

United States Electrical Exports

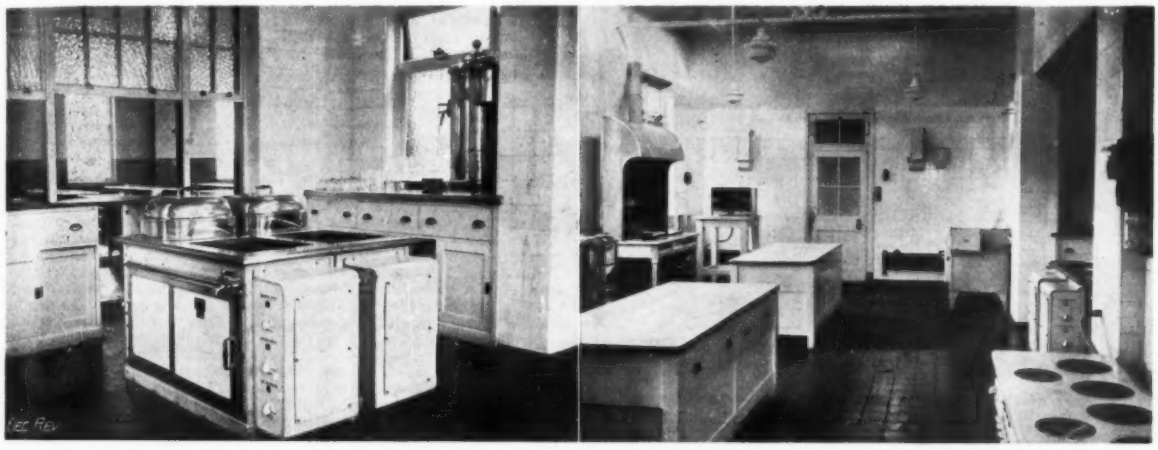
THE electrical exports of the United States last year—$43,380,000 in value—amounted to only about one-third of the 1930 level, and about one-half of the 1931 level. From the details given below it will be seen that only a few items—and these comparatively unimportant ones—show any improvement on the previous year's figures. Particulars of the distribution of the electrical trade by countries have not yet been made available.

	1932. Thous. $	Inc. or dec. as compared with 1931. Thous. $
D.C. Generators:		
Under 500 kW	59	— 131
500 kW and over	15	— 175
A.C. Generators:		
Under 2,000 kVA	158	+ 18
2,000 kVA and over	690	— 340
Steam turbine generator sets	110	— 910
Parts for generators	910	— 140
Arc welding sets	275	— 265
Self-contained lighting outfits	115	— 225
Batteries:		
6- and 12-V storage	820	— 650
Other storage	250	— 450
No. 6 dry-cell	185	— 265
Flash-light	1,870	— 730
Radio B and C (dry) ...	180	— 145
Other dry and wet primary	87	— 23
Power transformers over 500 kVA	620	— 390
Distribution transformers 500 kVA and less...	190	— 380
Instrument transformers ...	84	— 66
Other transformers	220	— 270
Battery chargers, non-rotating	26	— 29
Double current and motor generators, dynamotors, synchronous and other converters	260	— 890
Switchboard panels, except telephone	320	— 1,210
Power switches and circuit breakers over 10 A	500	— 720
Fuses	80	— 100
Watt-hour and other measuring meters...	230	— 340
Indicating instruments... ...	265	— 265
Recording instruments... ...	260	— 50
Other testing apparatus ...	540	— 90
Lightning arrestors, choke coils, reactors and parts	330	— 230
Motors, 1/3 h.p. and under ...	400	— 1,000
Motors, over 1/3 h.p. and under 1 h.p.	145	— 100
Stationary motors, 1-200 h.p. ...	500	— 990
Stationary motors, over 200 h.p.	60	— 570
Railway motors...	50	— 130
Elec. locos, railway	790	+ 620
Elec. locos, mining and industrial	140	— 300
Motor trucks	25	— 195
Starting and controlling equipment for industrial motors ...	480	— 790
Starting and controlling equipment for railway and vehicle motors...	70	— 170
Portable electric tools	320	— 470
Accessories and parts for motors	770	— 990
Household refrigerators ...	3,360	— 3,500
Commercial refrigerators up to 1 ton	1,370	— 400
Parts for refrigerators	1,960	— 1,040
Flash-light cases	300	— 230
Fans	220	— 210
Health exercisers	5	— 25
Incandescent light bulbs — For automobiles, flash-lights and Xmas trees	120	— 95
Other metal-filament bulbs...	410	— 190
Other elec. lamp bulbs ...	40	— 50
Searchlights and airport beacons	40½	— 205
Floodlights	45	
Household washing machines...	250	— 620
Domestic vacuum cleaners ...	380	— 800
Other domestic motor driven devices (except tools) ...	180	— 270
Flat-irons	90	— 110
Cooking ranges	140	— 270
Other domestic cooking and heating devices	250	— 390
Industrial elec. furnaces, ovens and other heating devices ...	220	— 680
Therapeutic and X-ray apparatus	640	— 480
Radio apparatus:		
Transmitting sets, tubes and parts	660	— 145
Receiving sets	7,320	— 7,040
Radio receiving tubes ...	2,010	+ 60
Receiving set components ...	2,520	— 1,370
Loud speakers	460	— 660
Other receiving set accessories	340	— 230
Telegraph apparatus	160	— 150
Telephone instruments... ...	80	— 240
Telephone switchboards ...	80	— 20
Other telephone equipment ...	670	— 970
Bells, buzzers, etc.	175	— 315
Starting, lighting and ignition equipment	620	— 50
Insulating material	250	— 310
Metal conduit, outlet and switch boxes	310	— 270
Sockets, outlets, fuse blocks and lighting switches	690	— 680
Interior lighting fixtures ...	420	— 840
Exterior lighting fixtures ...	120	— 170
Other wiring supplies and line material	380	+ 200
Other electrical apparatus ...	2,600	— 2,000
Total elec. machinery and apparatus	43,380	— 41,700
The following, not included in the total of electrical goods, were also exported—		
Insulated copper wire and cable:		
Rubber-covered	420	— 30
Weather-proof	180	— 100
Telephone cable	45	— 95
Other insulated copper wire...	390	— 1,320
Sparking plugs	1,310	— 120

generators for lighting, supplying electricity for the motors operating the fresh-water pumps, the piston cooling pumps, and the fuel-oil separators.

Electric Cooking at Barton

An electric kitchen has been installed in the new canteen at Barton. It is a single-storey structure, built in a small spinny between the power station and Redcliffe Road. The main dining-hall has seating accommodation for 200 people, and a separate small dining-room is provided for the station staff. The whole of the cooking, water-heating, and room-warming is done by electricity. The installation comprises a 10-kW 8-cu. ft. "Creda" double roasting oven; two 7-kW 4-ft. Moorwood hot cupboards, each with bain-marie and carving well; a 9-kW 8-ft. "Creda" hot cupboard; a 4.8-kW 6-cu. ft. Jackson steaming oven; a 9.6-kW six-plate "Creda" boiling table; a 5-kW 20-gal. "Creda" vegetable steamer; a 5-kW G.E.C. griller-toaster; a 14-kW Revo three-pan fish-frying range; and a 110-pint boiler (Jackson Boilers, Ltd.). The refrigerator was supplied by the International Refrigerator Co., the potato cleaner by Messrs. Moorwoods, Ltd., and storage water-heaters by Messrs. Bastian & Allen, Ltd. All conduit for wiring is fixed behind the white tiling. The building is heated throughout by "Wardle" oval tubes controlled by "Satchwell" thermo-



Serving tables and tea urn and (right) a general view of the all-electric kitchen at the Barton power station canteen

stats. The latest type of communal wash-fountains are installed, electric hand and face driers being provided.

Trade Announcements

Messrs. Hawnt & Co., electrical and wireless factors, 7-11, Imperial Buildings, Dale End, Birmingham, are moving tomorrow to larger premises at 59, Moor Street, Birmingham. Mr. H. V. Clayton, late Birmingham manager of Messrs. Faudels, Ltd., now represents Messrs. Hawnt & Co., in the Midlands.

Messrs. S. Bill & Co., Ltd., have appointed Mr. L. Bridgewood, 1071, Leeds Road, Bradford, as their Yorkshire agent, and Mr. C. Baker as representative for the Birmingham district, working from the company's head office at Aston.

The Soapstone Products Co. is moving to-day to 90, Wood Vale, Forest Hill, S.E.23 (telephone: Sydenham 1697).

The Ex-B.W. Reunion Dinner

On Friday evening last, at the Trocadero Restaurant, Mr. P. A. Sanders, O.B.E., J.P., presided over a gathering of 130 ex-British Westinghouse men. Mr. Symons, in proposing "The Association," paid tribute to the work of Messrs. W. W. Blunt, P. A. Lang, and Newcomb Carlton, who laid the foundations of the company. The chairman, in reply, referred to the large membership of the ex-British Westinghouse Association, and to the difficulties of present times. He suggested that help should be given by their old colleagues, wherever possible, to ex-B.W. men who needed it. A "Silent Toast" was drunk to members who had died since the last reunion. The resignation from the committee of Mr. A. R. Dyer, a past chairman of the Association, was accepted with regret, and Mr. B. P. Boyle has been elected in his place.

The Manx Scheme Contracts

With reference to the recent notices which have appeared in our pages relating to the placing of contracts in connection with the electricity scheme for the Isle of Man, Messrs. Johnson & Phillips, Ltd., wish to make it clear that in addition to the supply and erection of the overhead h.p. lines they were also responsible for the supply and erection complete of all the distribution transformers.

Prices of Materials

Messrs. F. Smith & Co. report, March 22nd.—Electrolytic copper bars and sheets, no change; electrolytic copper wire rods, £38, £4 15s. dec. Electrolytic copper h.c. wire, 6$\frac{9}{16}$d., $\frac{1}{16}$d. dec. Silicium bronze wire, 7$\frac{13}{16}$d., $\frac{5}{16}$d. dec.

Messrs. Edward Till & Co. report, March 22nd:—India-rubber, Para fine, 4$\frac{1}{4}$d., $\frac{1}{4}$d. dec.

Messrs. James & Shakespeare report, March 22nd: Copper bars (best selected), sheet and rod, no change. English pig lead, £11 15s., 15s. dec.

"Tufnol"

The manufacturers of this insulating material, dealt with in our issue of March 10th (p. 353), are Ellison Insulations, Ltd. (not "Insulators," as stated).

Electric Cooking in Alsace-Lorraine

The Société Alsacienne et Lorraine d'Electricité, of Strasburg, has for some time been devoting considerable attention to the development of electric cooking in country districts. In a report recently drawn up by M. J. Sattler, the general manager of the undertaking, it is stated that the propaganda has been extended to 115 villages in which a supply of electricity is available. The area has been divided into ten districts, to each of which has been allotted a foreman and a number of men whose work it is carry out installations and any repairs that may be necessary, each group of men taking part in the propaganda work being given an interest in the sale of electric cooking and other household appliances. M. Sattler remarks that factors contributing to success have been the permanence of the service, the selection of appliances which are suitable as much for the particular purpose for which they are intended as their relatively low cost and current consumption, and the education of consumers in the correct use of the appliances. The latter is achieved in various ways by demonstrations and lectures in the villages, and by the issue of a monthly bulletin, circulars, &c. He reports that the average consumption of 1,500 installations works out at 900 kWh per house per annum. A household of five persons uses from 125 to 150 kWh per month for cooking purposes, and a monthly total of about 100 kWh during the night for water-heating.

Belgian Foreign Electrical Trade

The official returns of Belgium's electrical imports and exports during 1932 show that there was a decrease in both directions. The total value of the imports amounted to £3,332,296 as compared with £4,486,408 in 1931, a decline of £1,154,112, or over 25 per cent. The exports fell from £2,640,240 to £1,740,936, a decrease of £899,304 or over 34 per cent.

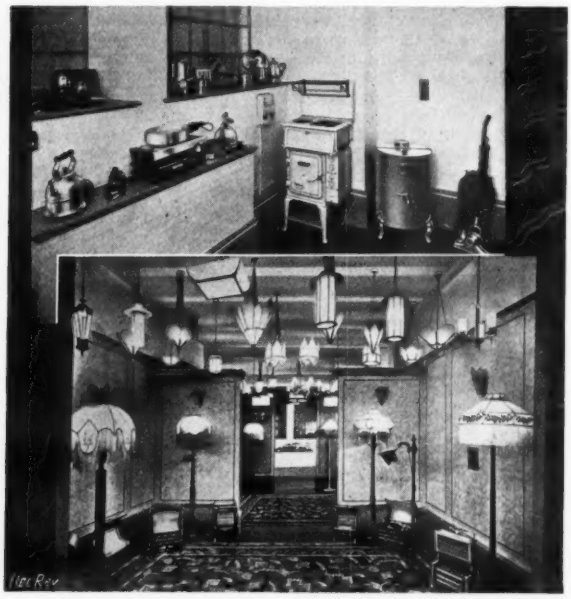
	Imports.		Exports.	
	1931.	1932.	1931.	1932.
	£	£	£	£
Dynamo-electric machinery	827,592	462,160	370,384	264,816
Dry batteries	59,784	45,440	20,256	2,304
Accumulators and parts	60,080	27,016	85,088	34,032
Magnets (other than electro-magnets)	6,816	3,688	56	152
Land and submarine cables	84,152	13,648	259,872	171,240
Insulated wires and cables	102,528	57,368	356,200	212,424
Copper wire (not insulated)	8,104	1,672	16,200	11,240
Carbons and electrodes	52,080	38,824	520	816
Porcelain insulators	43,320	27,536	3,768	2,248
Electric globes and glassware	73,072	48,040	17,104	37,760
Insulating tubes, junction boxes, etc.	42,840	25,048	8,480	11,192
Other insulating material	53,368	39,392	1,224	1,112
Arc lamps	728	4,736	16	—
Incandescent lamps	303,816	237,392	173,816	113,200
Radio valves	164,664	191,616	—	—
Electric measuring instruments	199,224	133,792	12,672	7,816
Telegraph and telephone apparatus	952,112	1,025,944	975,112	633,008
Other electrical apparatus	1,452,128	948,984	339,472	237,576
Totals	£4,486,408	£3,332,296	£2,640,240	£1,740,936

Electrical machinery was imported mainly from Germany, Sweden, and Switzerland, Great Britain's share being so small as to be included with "other countries." Denmark supplied most of the dry batteries. The United States took the first place as suppliers of accumulators and parts, the value being £10,032, Great Britain being second with £5,776. On the export side the Belgian Congo was the largest buyer of Belgian

electrical machinery, and Great Britain purchased most of the cables (£25,352) and insulated wire (£59,768).

Brown Brothers' New Showrooms

To provide greater facilities for electrical contractors and dealers in the London area to inspect the latest in fittings, accessories and domestic appliances, Messrs. Brown Brothers, Ltd., have converted a section of their premises at Great Eastern Street, E.C.2, into showrooms. As our illustrations show, these showrooms have been designed and arranged so as to display electrical equipment in more or less natural settings. For the use of dealers who wish to bring or send their customers to Great Eastern Street, the company is producing



Two views of the extensive new showrooms of Messrs. Brown Brothers, Ltd., at Great Eastern Street, E.C.2

books of introduction tickets entitling the dealer to full credit for whatever business is transacted.

Social Event

The annual dinner of the Croydon Corporation Electricity Department was held recently, when Mr. F. N. Rendell-Baker, borough electrical engineer, who presided, said the generation of electricity this year would reach a total of 118 million kWh, an increase of 36 millions. There were now 37,000 consumers and the number was being increased at the rate of four thousand a year. During the year over eighty miles of cable had been laid and a thousand cookers and 300 water boilers connected. Under the rental wiring system inaugurated seven months ago, they had had 6,000 applications.

New Catalogues and Lists

English Electric Co., Ltd., Queen's House, Kingsway, W.C.2.—An illustrated folder on air-break drum-type controllers for a.c. and d.c. motors.

Cox-Walkers, North Eastern Electric Works, Darlington.—Leaflets relating to bells, alarms, water-level indicators, staff locators, switchboards, &c.

Girlings, Ltd., Electricity Works, Maldon, Essex.—A folder describing the company's latest types of electric fires.

Radio-Aid, Ltd., 4, Iddesleigh House, Caxton Street, S.W.1.—A booklet giving particulars of instruments for the use of the deaf.

Brook Motors, Ltd., Empress Works, Huddersfield.—Lists Nos. 340 and 342, dealing respectively with control gear for slip-ring and squirrel-cage motors, and a.c. motors.

Thomas Broadbent & Sons, Ltd., Central Ironworks, Huddersfield.—A pamphlet (No. C.B.1), giving particulars of a new magnetic clutch.

Marelli & Co., Ltd., 19 and 20, Garlick Hill, Queen Victoria Street, E.C.4.—List No. S.M.438, containing details of ¼-h.p. split-phase induction motors.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A folder setting forth cogent arguments against the cutting of prices to uneconomic levels and for the purchase of known branded products.

Multitone Electric Co., Ltd., 95-93, White Lion Street, Islington, N.1.—Publications dealing with push-pull amplification and "Multitone" transformers.

Leslie Dixon Switchgear Co., 218, Upper Thames Street, E.C.4.—A leaflet on battery-charging equipment.

A. C. Cossor, Ltd., Highbury Grove, N.5.—An announcement of a reduction in the price of mains kits and receivers.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2.—A coloured folder illustrating the new "Gossama" lighting fittings.

T.B.T. Electric Co., Ltd., 171, Queen Victoria Street, E.C.4.—Leaflet No. 100, illustrating and describing portable agricultural motors.

Company Liquidations

B. & J. Wireless, Ltd., electrical and wireless component manufacturers, Alsen Works, Alsen Road, Holloway, N.—A meeting of creditors was held in London on March 16th. The statement of affairs showed liabilities of £5,747, and net assets of £1,383, leaving a deficiency of £4,364. It was reported that a committee of the principal creditors had come to the conclusion that while the business was a good one, considerable finance was needed in order to carry on, even should the creditors be willing to grant a moratorium. It was thought that an endeavour should be made to dispose of the business as a going concern, and the committee recommended that it should be carried on for a short period with that end in view. Resolutions were passed confirming the voluntary liquidation of the company with Mr. Froude, 1, Queen Victoria Street, E.C.4, as liquidator, together with a committee of five of the principal creditors. The following are the principal trade creditors: Adams Bros. and Burnley, Ltd., £381; Bromley, Langton & Co., £75; Brownie Wireless Co. (of Gt. Britain), Ltd., £51; Baldwins, Ltd., £57; Concordia Electric Wire Co., £192; Connollys, Ltd., £92; Feuriss, Ltd., £63; Hart Bros., Ltd., £95; A. E. Kew, £146; L.P.S. Electric Wire Co., £98; Mica & Micanite Supplies, £65; J. Sankey and Sons, £91.

J. Harrison & Co. (Smethwick), Ltd.—Winding-up voluntarily. Liquidator, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham. Claims to liquidator by April 25th.

Haslam & Stretton, Ltd.—Particlars of claims by April 30th to the liquidator, Mr. G. T. Needham, Baltic House, Mountstuart Square, Cardiff.

Meetings of Creditors

A. Vandam & Co., Ltd.—Creditors' meeting, March 27th, at 7, Staple Inn, Holborn, W.C.

Unalite, Ltd.—Creditors' meeting March 29th at 25, Finsbury Square, E.C.2.

Bankruptcy Proceedings

H. H. Bucklar, electrical contractor, 3, The Arcade, Hitchin.—first dividend of 1s. in the £ payable March 27th at 11, George Street West, Luton.

C. Bassham (Ashton & Holt), electrical engineer, 16, Cross Street, Ryde.—First and final dividend of 1s. 1¾d. in the £, payable March 28th, at 87, High Street, Portsmouth.

W. W. Overton, electrical and radio manufacturer, 139, Canterbury Street, Gillingham, Kent.—The public examination of this debtor was held recently at the Court House, Eastgate, Rochester. A statement of affairs had been prepared which disclosed gross liabilities of £127, of which £71 was expected to rank for dividend. The net assets were estimated to produce £16, leaving a deficiency of £54. The debtor attributed his position to his failure to pay a judgment debt, and bad trade since October last year. The examination was closed.

J. Ainsworth, J. W. Baildon, and **G. A. Mawson,** trading as "Radio Services and Repair Depot," radio dealers and engineers, 30, Whetley Hill and 217, Huddersfield Road, Low Moor, Bradford.—The first meeting of creditors was held on March 14th at the Official Receiver's office, Hallfield Chambers, 71, Manningham Lane, Bradford, and it was decided to leave the matter in the hands of the Official Receiver.

S. A. Sears, radio engineer, 98, High Street, Redbourne, Herts.—The public examination of this debtor was held recently at the Court House, St. Albans. A statement of affairs had been prepared which showed ranking liabilities of £183

A model building was used to demonstrate the various schemes of floodlighting at last week's Architects' Conference organised by the Electric Lamp Manufacturers' Association

and assets of £199. After allowing for preferential claims there was an estimated surplus of £15. The debtor attributed his failure to "commencing business without the necessary experience of the trade, depression in trade, and insufficient profits to meet living expenses." The examination was adjourned.

L. S. Green and **W. H. T. Green,** trading together as "L. and H. Green," wireless dealers, 162, Great Colmore Street, Birmingham.—The public examination of these debtors was held at the Court House, Birmingham, on March 15th. A joint statement of affairs was submitted which showed gross liabilities of £254, of which £253 was expected to rank for dividend, while the assets were estimated to realise £47. There was a deficiency, therefore, of £206. Debtors attributed their failure to lack of capital, inexperience and bad trade. The examination was provisionally closed.

Electricity Supply

Lighting, Domestic, Power

Acton.—SUPPLIES TO HOUSING ESTATE.—At a recent meeting of the Housing Committee the borough treasurer reported that he had interviewed the Metropolitan Electric Supply Co., Ltd., regarding the wiring of 318 houses on the Council's estate. The company maintained that to wire the houses for lighting only, with an adaptor for small appliances, was entirely uneconomical, and it would not therefore be prepared to lay the cables. If, however, the Council would install one power point for cooking purposes in each house the company would contribute £1 for each point and waive its stipulation that this contribution was only to be made in the event of the tenant arranging to purchase or to hire apparatus. The Committee decided to agree to this proposal.

Angus.—ELECTRICITY FOR LETHAM.—A special lighting district is to be formed at Letham, and electricity is to displace oil lamps for street lighting.

Arbroath.—PROTEST AGAINST ELECTRICITY CHARGES.—The Town Council is protesting against the charges made for electrical energy by the Arbroath Electric Light & Power Co., Ltd. If no satisfactory arrangement is reached with the company the matter is to be taken up with the Ministry of Transport and the Electricity Commissioners.

Ashton-under-Lyne.—THE CHANGE-OVER.—Progress is being made with the change-over from d.c. to a.c., and the work in the West End and Ryecroft areas to be carried out within the next two years will cost about £26,000.

Blyth.—APPLICATIONS FOR ELECTRICITY.—The Town Council is being pressed by residents on the Council housing estate to install electric lighting in their houses.

Bonsall.—HOPES FOR A SUPPLY SOON.—The Derbyshire & Nottinghamshire Electric Power Co. has completed its survey of the district and hopes to have a supply available for next winter.

Bridgend.—EXTENSIONS.—The Urban District Council is to apply for sanction to a loan of £3,945 to supply electricity to Penyfai Ewenny, Corntown, Coity (Byeastwood), Tondu (Bryn Road), and Cefnglas Road, Newcastle.

Brigham (Cumberland).—INAUGURATION OF SUPPLY.—A supply of electricity provided by the Mid-Cumberland Electricity Co. was inaugurated recently.

Brighton.—SUPPLY TO SOUTHERN RAILWAY.—In consequence of discussions which have taken place between the Central Electricity Board and the Southern Railway Co. regarding the supply of power by the Corporation to the recently electrified main line, the Electricity Committee has recommended that the railway should be supplied with power at a minimum pressure of 30,000 V at a standing charge of £3 5s. per year per kW of maximum demand, with a running charge of 0.225d. per kWh (subject to a coal clause). The Central Board has agreed to indemnify the Corporation against any loss that may be sustained.

MAINS EXTENSIONS.—Mains extensions costing £1,532 are recommended, together with the change-over from d.c. to a.c. in Manton Road and Moulsecoomb Avenue at a cost of £625.

Bristol.—APPLICATIONS FOR SUPPLIES.—Petitions for supplies have been received from residents in County Street and certain streets in Totterdown.

Brynmawr.—SUPPLY INAUGURATED.—A public electricity supply was switched on at Brynmawr last week by Mr. D. Smith (chairman of the Brynmawr Council) on behalf of the Shropshire, Worcestershire, and Staffordshire Electric Power Co. Councillor Smith, who was supported by several other members of the Council, expressed his gratitude for the opportunity, for the first time in the history of Brynmawr, to switch on electricity for commercial purposes, and, at the same time, hoped it meant to switch on to more prosperous times. At a subsequent luncheon, at which Mr. G. D. Coe, divisional manager of the S.W.S. Co. presided, he said that Brynmawr now had an unlimited supply of electricity, and he hoped that they would take full advantage of it. Mr. J. Shenton, district representative, and Mr. C. T. Allan also spoke. Those present included Mr. S. Short, clerk to the Council; Mr. H. Roberts, electrical engineer, Ebbw Vale Iron & Steel Co.; Mr. and Mrs. G. D. Coe; Mr. and Mrs. E. J. James; Mr. and Mrs. E. E. Hamar; and Mr. and Mrs. C. T. Allan.

Burnley.—RELIEF OF RATES.—The Corporation proposes to take £3,250 from the Electricity Department's profits towards the relief of the rates.

Canada.—WATER-POWER RESOURCES.—According to the annual review of the Dominion Water Power and Hydrometric Bureau of Canada the total water-power resources of the Dominion, now estimated to be 20,347,400 h.p. under conditions of ordinary minimum flow, or 33,617,200 h.p. ordinarily available for six months of the year, are equivalent according to present practice to a total turbine installation of about 43,700,000 h.p. The present total installation is 7,045,260 h.p., of which 378,993 h.p. was added during 1932.

THREAT TO ST. LAWRENCE SCHEME.—For the last few years, owing to the depressed condition of industry, the output of Canadian hydro-electric plants has very considerably exceeded domestic requirements and the capacity of the plants now renders a large surplus of power available. Owing to this surplus, the Government may postpone any action in connection with the St. Lawrence power development scheme.

FREE HEATERS.—In order to find a market for its surplus electrical energy the Ontario Hydro-Electric Power Commission has arranged with the Contractors' Association for the purchase of 50,000 electric heaters to be distributed free of charge in homes throughout the province. The Commission will supply the heater to the municipalities wishing to take advantage of the scheme, and the installation will be done by electrical contractors under contract awarded by the municipalities, the cost being borne by the Commission.

Canterbury.—NEW CHARGES.—The City Council has adopted the following new electricity tariff for the city and added areas: Lighting, up to and including 4,000 kWh per quarter, 4½d. per kWh (against 4½d.); beyond, 3½d. (4d.). Lighting, maximum demand, 8d. and 1d. (against 8d. and 1¼d.). Industrial power, up to and including 250 kWh per quarter, 1½d. (no change); not less than 251 kWh per quarter, 1¼d. (1½d.); not less than 501 kWh, 1d. (1¼d.); not less than 2,001 kWh, ¾d. (1d.); beyond 5,000 kWh, ¾d. (¾d). New domestic tariff for lighting, heating, and cooking, fixed charge of 15 per cent. of rateable value per annum for the first £150, and 7½ per cent. above, with a "unit" charge of ¾d.

Chester.—ELECTRICITY BYLAWS.—The Electricity Committee has instructed the town clerk to prepare a draft of proposed bylaws regarding premises supplied or proposed to be supplied with electricity by the Corporation.

Clitheroe.—ELECTRICITY FOR BOLTON-BY-BOWLAND.—A supply of electricity was recently switched on at the farming centre of Bolton-by-Bowland. The ceremony was performed by Major M. N. Wright, the Mayors of Blackburn and Haslingden being present. Practically the whole of Ribblesdale is now provided with electricity.

Croft (Yorks.).—ELECTRICITY OR GAS?—The question of bringing gas or electricity to the area is being considered by the Rural District Council.

Croydon.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £2,709.

Ealing.—FACTORY SUPPLIES.—An inquiry has been received from Virol, Ltd., as to the terms upon which the Corporation would be prepared to supply electricity to its factory in Hanger Lane.

SUB-STATION PLANT.—The Electricity Supply Committee is to apply for sanction to the borrowing of £12,500 for additional transformers and switchgear in certain 33,000-V sub-stations, orders for which are to be placed shortly.

Eccles.—PUBLIC LIGHTING IMPROVEMENTS.—The Electricity Committee has approved suggestions for reorganising the work of the Public Lighting Department, with a view to increasing the efficiency of the public lighting services, with particular reference to the maintenance, inspection, and repair of street lamps. The proposals provide, *inter alia*, for the purchase and fitting of 124 time switches.

Egremont.—NO ELECTRICITY FOR CASTLE CROFT HOUSES.—The Urban District Council has refused an application by the South Cumberland Electricity Supply Co. for permission to install electric lighting in Council houses at Castle Croft, on the ground that gas fittings had already been provided. The application was supported by a petition signed by 127 tenants.

Glasgow.—ELECTRICITY FOR HOUSING SCHEME.—The Electricity Committee at a recent meeting had before it an application from the Second Scottish National Housing Co. (Housing Trust), Ltd., for a supply of electricity, including the installation of hire-purchase wiring, to 474 houses owned by the company in the Shettleston area, which has now been taken over by the Corporation from the Clyde Valley Electrical Power Co. It was moved that the Corporation should take no action. An amendment that the Corporation should lay the necessary mains at an estimated cost of £6,500, provided that the company wired all the houses in the scheme and paid the Corporation £1,000 towards the capital expenditure upon cables, was carried.

MAINS EXTENSIONS.—Distributing mains are to be laid at a cost of £2,542.

Great Yarmouth.—DECORATIVE LIGHTING CHARGES.—Electricity consumed for outside decorative lighting or for decorative floodlighting of premises between June 1st and October 31st is to be charged for at 1d. per kWh.

NEW CABLES.—In order to meet the increased load it is proposed to lay additional feeder cables from Barnard Avenue to Caister, and from Ferry Hill to the Hopton sub-station, at a cost of £4,872.

ELECTRIC HEATING OF HOSPITAL.—Electric heating is to be installed in the diphtheria section of the Hospital at an estimated cost of £218.

FLOODLIGHTING SCHEMES.—The Recreation Grounds Committee has approved a revised scheme, costing £760, for the floodlighting of the boating lakes and sections of the tennis courts and bowling greens, and has allocated £500 for floodlighting the waterways in accordance with a scheme to be prepared by the electrical engineer.

Hertford.—LIGHTING INSTALLATIONS.—The Rural District Council is to have forty-two houses in its area wired for electric lighting.

Ipswich.—LOANS.—The Electricity Committee is to apply for sanction to the borrowing of £50,000 for mains extensions and services during the next three years, and £25,000 for strengthening the mains.

Isle of Thanet.—MINIMUM CHARGES.—The Isle of Thanet Electric Supply Co., Ltd., has reviewed the minimum charges under the Orders relating to Margate, Broadstairs, and the Isle of Thanet, and those for the winter quarters are to be 8s. 9d. up to 15 kWh, and for the summer quarters 5s. 10d. up to 10 kWh. Where consumers use electricity to the value of not less than £1 9s. 2d. per annum the minimum charges will not be enforced. In the case of the Westgate and Birchington Order the minimum charges are to be 10s. for the winter quarters up to 15 kWh, and 6s. 8d. for the summer quarters up to 10 kWh, these charges not to be enforced where the consumer uses electricity to the value of not less than £1 13s. 4d. per annum.

Japan.—ELECTRICAL DEVELOPMENTS.—The railway authorities have decided to complete the power station construction programme on the Shinano River not later than the fiscal year 1939-1940. First it is proposed to build the No. 1 Chitose station at a cost of 28,000,000 yen. This station, having a capacity of 44,000 kW, is to be completed in the year 1938-39, a commencement being made with the No. 2 Chitose station (40,000 kW) in the following year. The I.G.R. has also decided to press forward with the construction of the 62,000 kW Okuniyama station with a view to completing it by August, 1935.

Leek.—SPECIAL ORDER.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to extend its supply area so as to include the parish of Lowe and parts of the parishes of Tittlesworth, Leekfrith, Longsdon, and Cheddleton.

Littlehampton.—PURCHASE OF UNDERTAKING.—The Urban District Council has decided to apply to the Electricity Commissioners for consent to the purchase by the Council of the local electricity undertaking, and, if consent is given, for sanction to a loan for the purchase money and expenses.

London.—BATTERSEA.—The Electricity Committee recommends reductions in electricity charges as follows: Lighting flat rate, from 3¾d. to 3½d. per kWh; minimum quarterly charge for lighting flat rate during summer, from 7s. to 5s. "Unit" charge for rental wiring consumers, from 1d. to ¾d. Flat rate scale (in place of present charge of 1d. per kWh) up to 1,000 kWh per quarter, 1d.; 1,001 kWh to 5,000 kWh, 0.95d.; 5,001 kWh and over, 0.9d. Two-part tariff for business purposes (as alternative to flat rate), £10 10s. per annum per kW installed, with a "unit" charge of ¾d. These reductions will involve a saving of £16,000 per annum to consumers.

Electricity services are to be provided to 142 premises at a cost of £1,238. A loan of £20,000 for house wiring installations has been sanctioned, and permission is now to be sought to the borrowing of £13,530 for machinery and coal-handling plant instead of the £11,695 already agreed upon.

STOKE NEWINGTON.—Sanction has been received by the Borough Council to a loan of £2,000 for electric cookers.

ST. PANCRAS.—Having considered the question of adequate boiler capacity to meet the estimated load for next winter, the Electricity and Public Lighting Committee recommend that the modernising or replacement of its two Niclausse boilers should not be proceeded with, and that, if required, a supply of electricity shall be taken from the Central Electricity Board.

Sanction has been received to a loan of £1,140 for mains extensions to a sub-station at University College, while general mains extensions costing £1,766 are to be carried out.

HACKNEY.—It is proposed to abolish the charge for the consumer's main meter. Sub-meters will be supplied at a rental of 5s. per quarter. This proposal involves a concession of £9,000 per annum to consumers.

The Electricity Committee recommends a scheme of a.c. supply by means of transformer sub-stations at a cost of £12,500.

Montrose.—PRECAUTIONS AGAINST BREAKDOWNS.—At a recent meeting of the Town Council it was reported that the Lighting Committee had had under consideration the further breakdowns of the supply on February 26th and 28th, and had instructed the town clerk to write to the North of Scotland Electric Light and Power Co., Ltd., suggesting that the following steps should be taken to deal with a breakdown when the supply of electricity from the Grampian Electricity Supply Co. fails: (1) The appointment of an experienced engineer to be on duty during the night; (2) the provision of a standby Diesel engine or storage batteries. A letter was read from the North of Scotland Electric Light & Power Co., Ltd., regretting the interruptions, which were due entirely to a combination of exceptional circumstances and to severe weather conditions affecting the transmission system of the bulk supply company. The letter added that every possible step was being taken to introduce precautionary and remedial measures.

SCHOOL LIGHTING.—The Education Committee has resolved not to proceed further with consideration of the question of wiring schools for electric lighting while the supply company's charges remain at the present level.

Newcastle-on-Tyne.—FUTURE SUPPLIES.—Representatives of the North-Eastern Electric Supply Co., Ltd., recently met the Transport and Electricity Committee to discuss whether the City Council would continue to generate its own power at the Manors power station or would take supplies from the grid. The Committee has decided to consult an expert through the Association of Municipal Corporations before coming to any definite decision.

THE CHANGE-OVER.—Information respecting the change-over was contained in a letter to the City Council from Mr. H. A. Couves, general manager of the North-Eastern Electric Supply Co., Ltd. Mr. Couves stated that the value of the orders for new plant and apparatus placed by the company up to December 31st last in connection with the change-over was £35,157, and direct employment had been found for 184 men.

Newport (Mon).—SWITCHGEAR.—The Electricity Committee has obtained sanction to a loan of £18,298 for switchgear.

ELECTRICITY FOR LADYHILL PREMISES.—Electricity is to be provided for bungalows and other dwellings at Ladyhill.

LIGHTING OF MARKET HALL.—Electric lighting is to be installed at the Market Hall at a cost of £245.

Newtown (Mont.).—SUPPLY INAUGURATED.—The supply of electricity provided for the town by the North Wales Power Co., Ltd., was inaugurated last week by Mr. Arthur Hewitt, chairman of the North Wales & South Cheshire Electricity Authority. The extension has cost £20,000.

Paignton.—CHEAPER ELECTRICITY ASKED FOR.—The Urban District Council is to apply to the Paignton Electric Light & Power Co., Ltd., for a reduction in the price charged for electricity in the company's supply area.

Pontardawe.—COMPLETION OF ELECTRICITY SCHEME.—A dinner celebrating the completion of the Rural District Council's electricity scheme was given recently by Messrs. W. T. Henley's Telegraph Works Co., Ltd., the contractors, at the Mackworth Hotel, Swansea. Among those present were: Messrs. C. T. Allen (South Wales Power Co.), John Davies, J. Haydn Thomas, W. F. Bishop (general manager, Henley's), Tom Jeremiah (chairman, R.D.C.), John Arnold (chairman, electricity scheme), J. T. Collyer (Henley's), J. Wayne Morgan (consulting engineer), J. W. James (district agent), T. W. Way (Henley's), and R. Jenkins (clerk of works). The toast, "The Success of the Electricity Scheme," was proposed by Mr. W. F. Bishop, who said that last year 2,500 consumers had been connected to the mains, 600,000 kWh of electricity being consumed, and he hoped that the number would be considerably increased this year. Mr. Tom Jeremiah replied. As a memento of the scheme and their part in it, Mr. Wayne Morgan presented Messrs. Tom Jeremiah and John Arnold with electric reading lamps.

Portland.—SHOP-WINDOW LIGHTING.—The Electricity Committee has instructed the engineer to report further with regard to a special tariff for shop-window lighting during the day.

Robertsbridge.—STREET LIGHTING.—Salehurst Parish Council has decided to adopt electricity for street lighting at Robertsbridge.

Rothesay.—EXTENSIONS.—The Town Council is to extend the electricity supply to the Ardbec district.

SUCCESS OF FLOODLIGHTING.—The floodlighting of the promenade is to be extended and decorative lighting is to be continued along West Bay. Last season's experiment with floodlighting the putting greens is stated to have been a financial success. The Harbour Trust agreed to floodlight the pier clock-tower during August and September.

Sherborne.—OVERHEAD LINE DECISION.—Having reconsidered its previous decision, the Rural District Council has now consented to overhead cables being used by the Wessex Electricity Co. for the supply of electricity to Bradford Abbas, Yetminster, Thornford, and other parishes in its area. The proposed scheme, which is estimated to cost £30,000, would be abandoned if underground cables were insisted upon.

South Africa.—JOHANNESBURG.—It is estimated that for the year ending June 30th, 1933, the Electricity Department will show a profit of £113,997, and various reductions in electricity charges, involving a reduction in revenue of £40,037, are accordingly proposed.

SALISBURY.—An expenditure of £38,000 is proposed on the installation of a further 3,000-kW set, and associated equipment, at the municipal power station, and it is recommended that Mr. A. E. Val Davies, the Johannesburg consulting engineer, should be authorised to prepare the required plans and specifications.

Torquay.—EXTENSION OF SUPPLY AREA.—At a recent meeting of the Electricity Committee a letter was read from Teignmouth Electric Lighting Co., Ltd., with regard to the suggestion that the Corporation should become the undertakers in the area which lies behind the coastal portion of the parish of Stoke-in-Teignhead on its being included in the borough. The company intimated that providing the Corporation undertook to take over the e.h.p. main between the Newton Abbot urban district boundary near Buckland Barton and the St. Nicholas boundary in Butterflyland, and not to interfere with the duplicate supply to Teignmouth, etc., the directors

were prepared to discuss the matter. The town clerk, treasurer, and engineer were authorised to interview the company.

Tynemouth.—SUPPLY TO HOUSING ESTATE.—An application has been made for a supply of electricity to houses to be built at Howdon Road by the Square Building Trust, and the electrical engineer is arranging to lay cables from the sub-station at Dock Road.

EXTENSIONS.—Electricity is to be supplied to White House Farm at a cost of £190.

West Lancashire.—EXTENSIONS.—A scheme for supplying electricity to Banks is under consideration by the Rural District Council. The cost of the necessary h.p. and l.p. cable extensions is estimated at £1,500. A rough canvass indicates that about 200 houses would take supplies, and the electrical engineer has been asked to make further investigations and report to the Council. Provided that sufficient applications for supplies are received, extensions costing £2,500 are to be made in the New Cut Lane area of Halsall.

Wrightington.—STREET LIGHTING INQUIRY.—A Ministry of Health inquiry was held recently into the application of the Wigan Rural District Council for sanction to a loan of £300 for electric street lighting at Wrightington. There was no opposition.

Traction

Bootle.—TRAMWAY ABANDONMENT.—The Corporation is to apply for permission to abandon the tramways.

Croydon.—TRAMWAY RECONSTRUCTION.—The Corporation has obtained sanctioned to a loan of £4,150 for the reconstruction of the tramway in the High Street.

France.—DIESEL-ELECTRIC TRACTION.—Three powerful oil-electric locomotives for mixed work have just been placed in service by the Paris, Lyons & Mediterranean Railway; the machine seen on page 419 was supplied by Brown-Boveri & Co., Ltd. The engine develops 600 b.h.p. at 700 r.p.m., the hourly rating of the electrical equipment being equivalent to hauling 700 tons up 1 in 70 at 4 m.p.h. The locomotive weighs 85 tons, and has a maximum speed of 35 m.p.h., while the four nose-suspended motors have a maximum combined tractive effort of 41,000 lb.

Glasgow.—ELECTRIFICATION OF SUBWAY.—An official test of the electrified section of Glasgow Subway is to take place on Sunday. Unofficial tests have already been carried out, and if the experiment as a whole proves successful the Town Council will be asked to sanction the entire electrification of the Subway system.

Hull.—CHEAP TICKETS.—From April 9th to October 7th 6d. tickets will be available on any tram or bus between 4.30 p.m. and the close of the ordinary services, and there also will be 1s. all-day Sunday tickets.

London.—HACKNEY.—The Works Committee recommends the installation of automatic traffic signals at a cost of £9,974.

South Africa.—CAPETOWN.—Preparations for running an experimental trolley-bus in Capetown have now been made. The vehicle will run for about twelve months on the Gardens route, and at the end of that time the tramway company hopes to make arrangements with the Corporation to effect a general change-over from rail to trackless vehicles on certain routes.

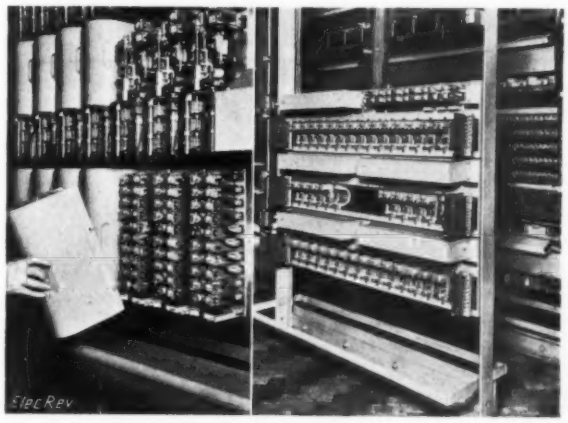
Sweden.—RAILWAY ELECTRIFICATION.—The Government has now laid a proposal before the Riksdag asking for an allowance of Kr. 11,000,000 for the starting of electrification work on the State Railway line between Gothenburg and Malmö, the so-called West Coast Line, with a junction line between Aengelholm and Hälsingborg. The estimated cost of Kr. 29,000,000 will be distributed over three financial years.—*Reuter's Trade Service* (Stockholm).

The control room at the Mount Pleasant station of the Post Office underground railway which runs between Paddington and Whitechapel and forms an important part of the London postal service

United States.—HIGH-POWER ELECTRIC LOCOMOTIVES.—The new Pennsylvania Railroad electric passenger engines, sixty-four of which were recently put into service, between New York and Philadelphia, are the most powerful type used on any railway in the United States. They are geared up for a possible speed of 90 m.p.h., and have three pairs of driving wheels, each 72 in. in diameter, with a four-wheel truck at each end. Each pair of drivers has its own motor, electricity being supplied through overhead wires. The engine is 62 ft. 8 in. long, weighs nearly 170 tons, and develops 1,250 h.p. per axle, continuous rating. The tractive effort at a speed of 63 m.p.h. is 22,300 lb. continuous.—*Reuter's Trade Service.*

Communications

Great Britain.—RADIO RELAY EXCHANGES.—The General Purposes Sub-committee of the Edinburgh Corporation has had an application from Mr. Andrew H. Baird for permission to install a wireless relay system in the city. Former applications of a similar kind have been declined, but Mr. Baird's was remitted for consideration to the Streets and Building Committee.



The new Strowger automatic telephone exchange at Wigan. In the left-hand picture are seen the final selectors with associated common control groups, while on the right is a part of a secondary finder rack

The Margate Town Council, after considering applications, has decided that a sub-committee shall inspect relay installations in other towns, including Nottingham.

The Kettering U.D.C. Highways Committee is to grant Mr. Paul Taylor permission to install relay services in Kettering and to erect wires over highways in connection with these services.

The Yarmouth Highways Committee, which has had eight applications, has agreed that permission be granted to Messrs. Bowers & Barr, Ltd., and Messrs. Lincoln & Egerton, on behalf of the various local wireless traders, to establish a relay service for a period of ten years.

Scotland.—NEW ISLAND CABLE.—A new cable between the mainland of Scotland and Lewis has been completed by the Post Office cable ship, *Monarch*, and was formally opened on March 21st. To maintain the volume of speech, amplifiers had to be installed at each end of the cable. A new telegraph circuit has been superimposed on the telephone line. The new cable is thirty-four nautical miles in length, while across Skye there are sixty miles of double wire for telephony and a similar length of single wire for the telegraphy. A total of 670 new poles were erected over the whole route, while altogether 255 miles of overhead wire were run out. The amount of wire in the submarine cable was 140 miles.

Canada.—RADIO LICENCE FEES.—It has been announced in the Dominion House of Commons that the broadcast receiving licence fee is to remain at $2 (about 8s. 4d. at par) for another year. For the ten months ended January 31st last the revenue collected was $1,396,447 (£279,290), which represents 725,000 licences.

Glasgow.—POLICE WIRELESS.—An expert from the Air Ministry in London is to be invited to advise the Glasgow city police force on the use of wireless telegraphy and telephony.

Wigan.—NEW AUTOMATIC EXCHANGE OPENED.—A new Strowger exchange was brought into public service at Wigan on March 11th. The equipment, manufactured and installed by Automatic Electric Co., Ltd., is known as the 30C system. By an adaptation of the Strowger two-motion switch substantial savings in first cost and floor space are secured, together with considerable simplification of operation and maintenance. The present and ultimate capacities of the Wigan exchange are 2,300 and 5,400 lines respectively. The exchange operates on four digits, metering being on the booster battery principle. The subscribers' lines are arranged in groups of 200, each group being served by a common group of line finders of the two-motion type, which are arranged to be conveniently self-routining or self-testing. Some of the equipment is illustrated above.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—May 2nd. Post and Telegraph Department. Loading coil pots. (A.X. 11716.)*
June 7th. City Council. One or two boiler units. City Electrical Engineer's Office (deposit £1 1s.).
BRISBANE.—May 15th. City Electric Light Co., Ltd. Coal conveyor. Company's offices, Boundary Street, Brisbane (specifications £2 2s.).
June 22nd. 45- and 11-kV switchgear. Company's offices (specifications £2 2s.).
July 20th. Supervisory control equipment. Company's offices (specifications £2 2s.).

Belgium.—BRUSSELS.—March 29th. Service du Matériel des Chemins de Fer Belges, 21, Rue de Louvain. Two lots, each of 25,000 metres, of insulated copper cable; two lots, each of 47,000 metres, of insulated copper wire; two lots, each of 16,500 metres of straight insulating tubes in 3-metre lengths; and 2,300 kg. of round copper coil wire.

Bury.—March 30th. Corporation. Electrical installation at block of business premises in Rock Street. Borough engineer, Bank Street, Bury (10s. deposit).

Carlisle.—April 5th. Electricity Department. Cables. (March 17th.)

China.—Chinese Government Purchasing Commission. Insulated cables. (March 10th.)

Dundee.—April 6th. Electricity Department. A.c. house service meters. (See this issue.)

Eccles.—March 27th. Electricity Supply Committee. Cable joint boxes. Borough electrical engineer, Electricity Offices, 1, King Street.

Edinburgh.—March 24th. Corporation. Installation of electric lighting in 432 houses at Niddrie Mains housing area. Engineer's Office, Dewar Place (deposit £1 1s.).
March 27th. Installation of electric lighting at kitchen quarters and educational block, City Hospital. Engineer's Office, Dewar Place (deposit £1 1s.).
March 27th. Gas Department. General stores, including electrical materials. Mr. H. H. Gracie, engineer and manager, 15, Calton Hill.

Egypt.—CAIRO.—April 25th. Ministry of the Interior. Motors, control panels, meters, &c. (A.X. 11738.)*

Farnworth.—April 3rd. Electricity Department. Cables and wiring accessories. (See this issue.)

Galloway.—March 28th. Galloway Water Power Co. Construction of Glenlee pipe-line. Sir Alex. Gibb and Partners, Queen Anne's Lodge, Westminster, S.W.1 (fee £10 10s.).

Glasgow.—April 4th. Housing Department. Materials, including electrical fittings and cables. Director of housing, 20, Trongate.
March 27th. Electricity Department. Electric lighting installations at rehousing scheme and shops. General manager, Electricity Department, 75, Waterloo Street.
April 1st. Public Health Department. Various articles, including electrical fittings for hospitals, &c. Superintendent of stores, Public Health Department, 23, Montrose Street.

Gloucester.—Electricity Department. 6,000-kVA 33-kV/11-kV transformers. (See this issue.)

Great Western Railway.—April 6th. Electric wires and cables, telegraph ironwork and lamps. (March 10th.)

India.—April 5th. Bombay, Baroda and Central India Railway. Composition boxes, plates, separators, &c., for train-lighting accumulators; also lamps. (See this issue.)
NEW DELHI.—April 24th. Indian Stores Department. Wall plugs, ceiling roses, &c. (A.X. 11739.)*

Kirkcudbright.—March 25th. County Council. Electrical installation work in connection with assisted wiring scheme. Messrs. Buchan & Partners, 16, Young Street, Edinburgh (deposit £1 1s.).

Kirriemuir.—March 28th. Town Council. Electric lighting work for twenty houses. Mr. J. S. Bruce, burgh surveyor, Kirriemuir.

Lithuania.—KOVNO.—March 29th. Administration of Posts, Telegraphs and Telephones. Telephone cable, wire, telephone sets and instruments. (A.X. 11715.)*

Morocco.—CASABLANCA.—April 19th. Public Works Department. Electric cable and transformer sub-stations for supplying four coal-handling cranes. (A.X. 11733.)*

Northern Ireland.—April 3rd. Electricity Board. L.p. distribution systems. (March 3rd.)

South Africa.—CAPETOWN.—April 5th. Electricity Department. Overhead line material. (A.X. 11730.)*
JOHANNESBURG.—April 20th. City Council. Weatherproof braided copper conductors (A.X. 11724.)* and a 1,000-kW a.c. to d.c. convertor plant (A.X. 11725)*.
April 15th. 300-A, 6,600-V isolating links. (A. 11737.)*
DURBAN.—April 21st. City Council. Lead-covered paper-insulated telephone cable (A.X. 11726)*, cable distribution boxes and sundries (A.X. 11727)*, and lead-covered indoor telephone cable (A.X. 11728)*.

Southport.—April 11th. Southport and District Water Board. Three electrically driven centrifugal pumping sets. Mr. C. B. Ede, engineer and manager, 14, Portland Street (deposit £3 3s.).

Stoke-on-Trent.—April 5th. Electricity Department. Static transformers and e.h.p. truck-type switchgear. (March 17th.)

Tynemouth.—April 3rd. Electricity Department. Voltage regulator and 200-kW mercury rectifier. (March 10th.)

Tilbury.—April 10th. Urban District Council. Electric lighting and cooking installations in Council houses. (See this issue.)

Warrington.—April 3rd. Electricity Department. Transformers. (March 17th.)

West Riding.—County Council. Persons and firms wishing to have their names placed on the list of those from whom the Supplies Committee may invite quotations for various services and stores are asked to apply to the manager, Supplies Department, Cliff Lane, Wakefield. (See this issue.)
March 25th. Public Assistance Committee. Automatic electric bed lift (load 7½ cwt.) for County Hospital, Wakefield. County architect, County Hall, Wakefield.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Acton.—Housing Committee. Recommended. Electrical installations in 318 Council houses (£1,855).—H. J. Petts & Co.

Brighton.—Electricity Committee. Recommended. Crane (£1,839).—Clarke, Chapman & Co., Ltd. Telpher travelling bridge (£2,500).—Fraser & Chalmers Engineering Works. Three feeder pumps (£2,500).—Mather & Platt, Ltd. Back-pressure turbine (£6,450).—Richardsons, Westgarth & Co., Ltd.
Tramways Committee. Recommended. Lamps.—L. Andrew & Co. Trolley wire.—Whitecross Co., Ltd.
Aquarium Committee. Accepted. Tubular lighting at booking office (£212).—Maple & Co.

Chester.—Electricity Committee. Recommended. Switchgear (£393).—G. P. Dennis, Ltd.

Croydon.—Electricity Committee. Recommended. Radiant type superheaters (£1,726).—Foster Wheeler, Ltd.

Ealing.—Town Council. Accepted. Electrical wiring of new fire station and buildings (£516).—Watson & May.

Girvan.—Town Council. Accepted. Electric lighting of the Town Hall.—Watson & Dundas.

Glasgow.—Transport Committee. Accepted. Copper bonds.—British Insulated Cables, Ltd.

Government Contracts.—The following contracts were placed by the various Government departments during February :—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.

Motor generator.—Small Electric Motors, Ltd.
Electric cable.—Anchor Cable Co.; B.I. Cables; Derby Cables; Ediswan Cables; Enfield Cable Works; G.E.C.; Greengate and Irwell Rubber Co.; W. T. Glover & Co.; Hackbridge Cable Co.; Henley's; Hooper's Telegraph & India Rubber Co.; I.R.G.P. and Telegraph Works Co.; Johnson & Phillips; Liverpool Electric Cable Co.; Macintosh Cable Co.; Mersey Cable Co.; St. Helens Cable & Rubber Co.; Siemens Electric Lamps & Supplies.
Lampholders.—Player, Mitchell & Breeden; S. Heath & Sons; Sperryn & Co.; Kersons Manufacturing Co.; W. McGeoch & Co.; G.E.C.; Rainsford & Lynes.
Motor for dynamic balancing machine; searchlight projectors.—Laurence, Scott & Electromotors.
Searchlight reflectors.—C. A. Parsons & Co.
E.h.p. truck-type switchgear.—B.T.-H. Co.
Electric five-ton winches.—Cowans, Sheldon & Co.

WAR OFFICE.

Generating sets.—Mirrlees, Bickerton & Day.
Replacing electric traction battery.—Chloride Electrical Storage Co., Ltd.

CROWN AGENTS FOR THE COLONIES.

Generating set.—Ruston & Hornsby.
Switchgear.—B.T.H. Co.
Telephone equipment.—G.E.C.
Turbo-generator.—Brush Electrical Engineering Co.

POST OFFICE.

Telephone apparatus.—Automatic Electric Co.; Ericsson Telephones; G.E.C.; Phœnix Telephone & Electric Works; Siemens Bros.; Siemens Electric Lamps & Supplies; Standard Telephones & Cables; Telephone Mfg. Co.
Testing and protective apparatus.—Phœnix Telephone and Electric Works; H. W. Sullivan.
Electric bulbs.—A. C. Cossor.
P.c. cable.—Connollys (Blackley); Siemens Bros.; Hackbridge Cable Co.
Clocks.—Venner Time Switches.
Telephone cords.—B.I. Cables; Phœnix Telephone & Electric Works; Standard Telephones & Cables.
Telephone exchange equipment.—Manchester, Edinburgh, Glasgow and Cardiff trunk exchanges: Standard Telephones and Cables. Whitehall (first unit); Sheffield trunk exchange: Siemens Bros. Crossgates (Leeds); Cheltenham; Adel (Leeds): Automatic Electric Co. Colchester; Reliance (London): G.E.C. New Milton (Hants); Peterborough; Ayr: Ericsson Telephones.
Telephonic repeater equipment.—Dundee: Aberdeen: Standard Telephones & Cables. Taunton: G.E.C.

H.M. OFFICE OF WORKS.

Cooking apparatus at Birmingham head post office.—Carron Company.

Hull.—Electricity Committee. Recommended. Storage heaters.—Berry's Electric, Ltd. Immersion heaters.—General Electric Co., Ltd. Wash boilers.—Burnley Components, Ltd.

Hyde.—Corporation. Health Committee. Accepted. Electric lighting at Back Bower hospital extension.—C. A. Lamb.

Kettering.—Electricity Department. Accepted. E.h.p. and l.p. cables.—Union Cable Co., Ltd.

Kirkcaldy.—Town Council. Accepted. Electrical work at two housing schemes.—J. G. Woodcock.

London.—HACKNEY.—Electricity Committee. Recommended. E.h.p. and l.p. cables.—British Insulated Cables, Ltd. House wiring cables and flexible cords (£3,686).—Edison Swan Electric Co., Ltd. The lowest tender received was for £3,243, but the schedule prices were subject to variations for the cost of lead and copper. Ordinary prepayment meters.—Metropolitan-Vickers Electrical Co., Ltd. Two-part tariff prepayment meters.—Chamberlain & Hookham, Ltd. Demand indicators.—Reason Manufacturing Co., Ltd.

ST. PANCRAS.—Cables.—Hackbridge Cable Co., Ltd. (£559); Metropolitan Electric Cable & Construction Co., Ltd. (£58). Switchgear.—A. Reyrolle & Co., Ltd. (£200); English Electric Co., Ltd. (£202).

BATTERSEA.—Electricity Committee. Recommended. Supplies for one year:—Cables.—Callender's Cable & Construction Co., Ltd. Meters.—Chamberlain & Hookham, Ltd. Bitumen.—Dussek Bitumen & Taroleum, Ltd. H.p. switchgear for Grayshott Road sub-station (£964).—Switchgear & Cowans, Ltd. L.p. switchgear for the same station (£1,155). H.p. switchgear at Lavender Hill sub-station (£256). Synchronising panels in control room at generating station (£143).—General Electric Co., Ltd.

STOKE NEWINGTON.—Electricity Committee. Recommended. Supply of electrical apparatus for twelve months:—Cookers.—Belling & Co.; General Electric Co., Ltd. Kettles.—Bulpitt & Sons, Ltd. Wash boilers.—Revo Electric Co., Ltd. Cooker control units.—J. H. Tucker & Co., Ltd. L.p. cables.—W. T. Henley's Telegraph Works Co., Ltd.; Metropolitan Electric Cable & Construction Co., Ltd. Meters.—Measurement, Ltd.; Aron Electricity Meter, Ltd.; Chamberlain & Hookham, Ltd. Electrical installation work.—W. B. & H. C. Cables, Ltd.

Swansea.—Electricity Committee. Accepted. Stores for twelve months:—Cables.—Callender's Cable & Construction Co., Ltd.; Pirelli-General Cable Works, Ltd. Cable boxes.—W. Lucy & Co., Ltd.; David Evans; Callender's Cable and Construction Co., Ltd.; Sykes & Dyson, Ltd.; J. Quipp; Riverside Foundry Co. Fuse boxes and sealing cups.—W. Lucy & Co., Ltd.; Parmiter, Hope & Sugden, Ltd. Meters and demand indicators.—Electrical Apparatus Co., Ltd.; Siemens Electric Lamps & Supplies, Ltd.; Aron Electricity Meter, Ltd.; Thompson & Co.; British Insulated Cables, Ltd.; Measurement, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Crompton Parkinson, Ltd. Time switches.—Horstmann Gear Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Wiring, electrical fittings and lamps.—Simpson Baker & Co., Ltd.; "M.K." Electric, Ltd.; Walsall Conduits, Ltd.; J. Quipp; W. H. Stone & Co. (Cardiff), Ltd.; Woodhall & Partners, Ltd. (1929); Falk, Stadelmann & Co., Ltd.; Edison Swan Electric Co., Ltd.; British Insulated Cables, Ltd.; L. Andrew & Co.; Electrical Conduits, Ltd.; South Wales Engineering Supply Co. (Swansea), Ltd.; General Electric Co., Ltd.; Westward Electric Co. (1928), Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; British Thomson-Houston Co., Ltd.

Forthcoming Events

British Electrical Development Association.—Friday, March 24th. Caxton Hall, Westminster, S.W. 7 p.m. National finals in the E.D.A. Public Speaking Competition. (*Northern Counties Area*).—Thursday, March 30th. Sopwith's Lounge, Newcastle-upon-Tyne. 7.15 p.m. "One of a Team." Mr. W. F. T. Pinkney.

Birmingham Electric Club.—Friday, March 24th. Grand Hotel, Birmingham. 7 p.m. "Modern Electrical Problems dealt with Experimentally." Mr. J. F. Driver.

Institution of Electrical Engineers.—Monday, March 27th. Institution, London. 7 p.m. Informal meeting. Discussion on "The Performance of Fractional h.p. Motors." Opened by Mr. A. N. D. Kerr. (*North-Eastern Centre*).—Monday, March 27th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. "The Present Practical Limits of Power Station Efficiency." Mr. W. S. Burge. (*North-Western Centre*).—Tuesday, March 28th. Engineers' Club, Manchester. 7 p.m. Mr. Burge's paper. (*Scottish Centre*).—Tuesday, March 28th. North British Station Hotel, Edinburgh. 7 p.m. "Ionisation in Cable Dielectrics." Mr. P. Dunsheath. (*London Students' Section*).—Tuesday, March 28th. Instn, Ldn. 6.15 p.m. "The Future Prospects for Electrical Engineers." Prof. E. W. Marchant. Saturday, April 1st. 2.30 p.m. Visit to the North Met. Co.'s power station, Brimsdown. (*North Midland Students' Section*).—Tuesday, March 28th. Hotel Metropole, Leeds. 7.15 p.m. "The Automatic Control of Modern Power Station Steam Generators." Mr. W. L. M. French. (*South Midland Students' Section*).—Midland Hotel, Birmingham. 7 p.m. Joint meeting with Rugby Engineering Society. 7 p.m. "Hydro-Electric Power Generation." Mr. L. D. Anscombe.

Electrical Power Engineers' Association (London Technical Group).—Tuesday, March 28th. Junior Institution of Engineers, London. 7.15 p.m. "Modern Domestic Electric Appliances from the Supply Undertakings' point of view." Mr. H. G. Gamble.

Diesel Engine Users' Association.—Thursday, March 30th. Caxton Hall, Westminster, S.W. 3 p.m. "Fuel Characteristics in Relation to Pump and Sprayer Action." Messrs. L. J. Le Mesurier and R. Stansfield.

Our Service Department

We shall be glad to learn the names and addresses of the makers of the following:—

Inquiries must be accompanied by a stamped addressed envelope.

"MORRIS CENTRAL" oil and electrically heated radiator.

"RAYVECTO" panel radiator.

Makers of powder and moulding machinery for making "Bakelite" mouldings for electrical purposes. Silicon steel alloy sheets (0.02 in. and 0.016 in. thick) of different grades, with and without paper insulation (for India).

TILTALITE electrical fittings.

Notes

An Electrode Boiler Installation

The conditions laid down in connection with the heating and ventilating installation at the new Tootal Broadhurst Lee Company's headquarters at Manchester, supplied by Richard Crittall & Co., Ltd., were that "off-peak" electricity must be used; the temperature must be thermostatically maintained within 1.5 deg. F. of the specified temperature; the plant must operate automatically with no other attention than occasional inspection; and the electricity consumption in any one heating season must not exceed an agreed figure. The building contains offices, showrooms and stores, and it will eventually have sixteen floors. Low-temperature hot-water ceiling panel heating serves the showrooms and sales floors, and the panels are controlled in groups by thermostatically governed magnetically operated valves. The ventilation and heating of the warehouse floors was planned for a balanced system of fresh-air distribution and vitiated-air extraction, a heater battery forming part of the fresh-air supply equipment. Ozonising apparatus is installed in the main air stream.

The warming installations are served by an automatically controlled electric thermal storage plant, consisting of two 750-kW, 6,000-V electrode boilers and a storage cylinder, with a total thermal-storage capacity of 26 million B.th.u. The primary circulating pumps are controlled in conjunction with the electrode equipment, the starting and regulation of which is controlled by thermostats in the storage. The temperature of the storage, fully charged, is 285 deg. F., and at the end of the discharge period, in the severest weather, it may fall to 110 deg. F. Emergency thermostats in the heaters prevent excess temperatures and automatically shut down the plant in the event of a fault developing. The supply of circulating water to the panel system and the heater battery is regulated by automatic modulators controlled by multiple thermostats.

A Large French Cinema

The new Rex Cinema in Paris is an example of an application of electricity which is growing in importance. Altogether it has a connected load of 1,325 kW, of which the stage and auditorium lights account for 500 kW. It has electrical air-cooling apparatus, heating equipment, lifts, and telephones, to say nothing of such minor applications as electrical ticket-issuing machines. A special feature is an electric light "organ"—a keyboard bearing switches which are manipulated to give an endless variety of coloured lighting. The Rex has a private 1,500-kVA sub-station which receives power at 12,000 V from the Cie. Parisienne d'Electricité, and there is an 800-Ah emergency battery. Some pictures of the cinema appear on p. 417.

Grid Tower Rentals

The Central Landowners' Association, in conjunction with the National Farmers' Union, the Land Union, and a number of professional organisations, has concluded an agreement with the Central Electricity Board relative to payments for grid towers erected on agricultural land. Such payments are to be divided, according to an agreed schedule, into rentals to the owner, and proportionate compensation for interference with agriculture to be paid to the occupier of the land, in addition to making good any damage.

Appointments Vacant

Assistant mains engineer for York Electric Lighting Dept.

Temporary mains assistant for Dover Electricity Department.

(See our classified advertisements.)

Indexed List of Specifications

The British Standards Institution has issued its half-yearly handbook, which includes an indexed list of the British Standard Specifications. The activities of the three divisions—engineering, building, and chemical, as indicated in the list of new specifications in preparation—shows the valuable work voluntarily carried out by the Institution's six hundred technical committees. The indexed list, which covers forty pages, includes both a numerical list and a complete subject index of B.S. Specifications. Copies are available from the British Standards Institution (Publications Department), 28, Victoria Street, London, S.W.1, price 1s. 2d. post free.

The E.A.W.

Grade I Demonstrators' Diplomas have been awarded to thirty-nine new applicants who satisfied the Committee's requirements, bringing the total up to 171. These are the final grants. In future the Electrical Housecraft Certificate will be awarded upon the results of examination and the Diploma will be awarded after satisfactory experience in the industry. A syllabus of the electrical knowledge which will be expected of candidates for examination is obtainable from the headquarters of the E.A.W., 20, Lower Regent Street, S.W.1.

A Paris E.H.P. Conference

The seventh session of the International Conference of Large H.V. Distribution Undertakings is to be held in Paris from June 18th to 24th next. The session will comprise nine meetings, *i.e.*, three dealing with power generation and transformation; three with the erection, maintenance, and insulation of h.v. transmission lines; and three with the working and protection of distribution systems. Full particulars of the proceedings can be obtained from the Secretariat of the Conference, 54, Avenue Marceau, Paris.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. Edward Hughes, whose article on "The Design of Permanent Magnets" appears on p. 410, received his technical training at the Heriot-Watt College, Edinburgh, serving an apprenticeship with Messrs. Crompton & Co., Chelmsford, with whom he subsequently held the position as designer. He later joined the General Electric Co., Ltd., Witton, and served during the war at H.M. Signal School, Portsmouth. For four years he returned to the Heriot-Watt College as lecturer in electrical engineering and since 1919 has been head of the Electrical Engineering Department of Brighton Technical College. He has had six papers published in the *I.E.E. Journal* and has read papers before the Physical Society, the British Association and other scientific bodies.

[*Ralston, Glasgow*

Mr. J. Jamieson

Mr. J. Jamieson, of Glasgow, has joined the board of Messrs. Bastian & Allen, Ltd. Mr. Jamieson, who is very well known in Scotland, is a Bachelor of Science (Engineering) of Glasgow University and an associate member of the Institution of Electrical Engineers.

Mr. R. H. Upton, of York, has been appointed mains superintendent to the Ealing Corporation Electricity Department.

Dr. J. T. Dunn, B.Sc., M.Sc., F.I.C., has been elected president of the Society of Chemical Industry for the year 1933-34. Dr. Dunn is head of the firm of Messrs. J. & H. S. Pattinson, and is the Public Analyst for a large area of the North-East Coast.

Mr. H. Brierley has been appointed distribution superintendent to the Croydon electricity undertaking at a salary of £570, in succession to Mr. Gripper, who, as reported in our February 17th issue, has been appointed deputy borough electrical engineer to Eastbourne Corporation.

Mr. L. A. Gripper was presented by his colleagues at Croydon with a wireless receiver and a leather case at the recent annual dinner of the Electricity Dept. staff.

Mr. C. E. Morgan, secretary to the Direct Spanish Telegraph Co., Ltd., who has been with the company for fifty-nine years, has been elected to the board of directors.

Major Gladstone Murray, controller of the British Broadcasting Corporation, sailed for New York on March 14th, *en route* for Canada, where he will advise the Canadian Government on the creation of a national broadcasting system on the model of the B.B.C.

Mr. J. Coxon has been nominated as chairman of the South Midland Centre of the Institution of Electrical Engineers for the 1933-34 session, and **Messrs. W. Burton** and **E. F. Hetherington** have been nominated as vice-chairmen.

Mr. E. Morgan, chief electrical engineer and manager of the Sheffield Corporation Electricity Department, who has been largely responsible for the design and construction of the new Blackburn Meadows power station (described on p. 408 of this issue), has introduced into this country several novel features in power-plant operation, including the compressed-air operation of the main switchgear. Mr. Morgan received his electrical training with the British Westinghouse Co., and held appointments with the Yorkshire Electric Power Co. and Wolverhampton Corporation Electricity Department before taking up his present position at Sheffield in June, 1929. He is a member of the Institution of Electrical Engineers, and an associate member of the Institutions of Civil and Mechanical Engineers.

Mr. E. Morgan, city electrical engineer, Sheffield

Mr. J. R. Anderson (Birmingham Corporation) has been nominated as chairman of the South Midland Students' Section of the Institution of Electrical Engineers, and **Mr. J. C. Turnbull** (Higgs Motors, Birmingham) as vice-chairman.

Mr. R. Westwater, B.Sc., has been awarded the Mavor and Coulson post-graduate travelling scholarship by the Institution of Mining Engineers. Mr. Westwater is engaged by the Lochgelly Iron & Coal Co., Ltd., and is president of the Scottish Mining Students' Federation.

M. Paul Boucherot has been awarded the Mascart triennial medal offered by the Société Française des Electriciens for the most meritorious work in connection with pure and applied electricity.

Mr. Ivan Giles, an electrical engineer with the Foster Electrical Engineering Co., was married on March 8th to Miss G. Ely, of Sutton.

Mr. W. Scott Atkinson, eldest son of Mr. and Mrs. Llewellyn B. Atkinson, was married on March 18th at St. Nicholas Church, Sevenoaks, to Miss Joyce Humphrey, only daughter of Mr. and Mrs. F. Humphrey, of Sevenoaks.

Our Bradford correspondent informs us that writs of alleged libel have been issued at the instance of **Mr. T. Roles,** city electrical engineer, and **Mrs. M. Carruthers,** chairman of the Bradford branch of the Electrical Association for Women, against Alderman L. F. W. S. Smith and Mr. B. Johnston, secretary of the Bradford Citizens' League. It is understood that libel is alleged in respect of an anonymous communication referring to the Bradford Electricity Department sent to the Citizens' League.

Mr. P. J. Pybus, the late Minister of Transport, has been reappointed a director of Associated Portland Cement Manufacturers.

Obituary

Sir E. Manville.—The death occurred in London on Friday last, at the age of seventy-one, of Sir Edward Manville. Sir Edward commenced his electrical career in Dublin with the Brush Electrical Engineering Co. Later he joined the staff of Messrs. Woodhouse & Rawson as their engineer, and was engaged on various electric lighting installations. He became managing director of the Jablochkoff Co., and also the United Electrical Engineering Co. In 1892 he entered into partnership with Mr. J. E. Waller, and later the firm was joined by Mr. J. Kincaid and Sir Philip Dawson. He was responsible for the design of many electrical undertakings at home and abroad, one of the most important being the tramway system of Buenos Aires. In addition to his electrical work, Sir Edward was a pioneer of motoring, and became chairman of the Daimler and B.S.A. Companies. He was the chairman or a director of many companies, a former president of the Association of British Chambers of Commerce, and a vice-president of the Federation of British Industries. He became a member of the Institution of Electrical Engineers in 1889. He was the Unionist Member of Parliament for Coventry from 1918 to 1923, and was knighted in the latter year.

[*Int. Rotogravure*

The late Sir Edward Manville

Professor W. C. Unwin.—Professor William Cawthorne Unwin, who died last Tuesday at the age of 94, was probably best known to our readers for his work in drawing up plans for the Niagara Falls hydro-electric scheme in 1890, for which he was later retained as consultant. After completing his early training and graduating as B.Sc. at London University he managed an engineering works for seven years before taking up an academic career in 1868, when he became instructor at the Royal School of Naval Architecture and Marine Engineering. From 1872 to 1885 he was Professor of Hydraulic Engineering at Coopers Hill, and afterwards, until 1904, when he became Emeritus Professor, he held the chair of Engineering at the Central Technical College of the City and Guilds of London Institute, South Kensington.

Although his career was mainly devoted to teaching, Professor Unwin was regarded as a thoroughly practical engineer in many fields. As a writer he gained eminence, and his book, "The Elements of Machine Design" (published in 1877), became a classic; another important work was "The Development and Transmission of Power from Central Stations" (1894) based on a course of Howard Lectures. He also contributed articles on hydraulics and bridges to the "Encyclopædia Britannica." In 1896 he delivered the James Forrest Lectures on the experi-

mental study of the steam engine, the Watt Lecture, and, in 1897, the Cantor Lectures. Professor Unwin served as president of the Engineering Section of the British Association in 1892, of the Institution of Civil Engineers (of which he was made an honorary member) in 1911, and of the Institution of Mechanical Engineers in 1915 and 1916. He was a Fellow of the Royal Society, and served on the Council in 1894. He was the first recipient of the Kelvin Medal in 1921.

The funeral service was held at Kensington Chapel on Monday. Those present included Sir Archibald Denny, Sir H. Carpenter, Sir Robert Hadfield, Sir Alexander Gibb, Col. Crompton, Mr. G. L. Addenbrooke, Mr. R. W. Weekes, representatives of engineering and other institutions, and many other well-known people.

Mr. W. J. Potter.—The funeral of the late Mr. William Joseph Potter, director of W. T. Henley's Telegraph Works Co., Ltd., took place at Golders Green Crematorium last Saturday. Many business and personal friends and members of the staff were present, among them being Mr. L. P. Potter, Mr. and Mrs. E. L. Potter, Miss Potter, Mr. Potter Cuff, Mr. F. Chapman, Mr. A. E. Salmon (chairman of the company) and Mrs. Salmon, Sir George Sutton (president), Sir Montague Hughman and Mr. R. J. Hatton (directors), Mr. W. F. Bishop (general manager), Mr. G. E. Rhodes (assistant general manager), Mr. A. H. M. Jacob (secretary), Mr. P. Dunsheath (research and technical manager), Mr. R. O. Wright (Gravesend works manager), Mr. E. Lefeaux (Woolwich works manager), Mr. E. J. Pond (Midland District superintendent), Mr. T. J. Hudson (South Coast representative), Mr. F. Anderson (sales manager), Mr. A. H. Foster (cashier), Mr. B. C. Wilkins (accountant), Mr. J. T. Colyer (contract engineer), Mr. W. C. Barry (research department), Mr. F. J. Bettley (transport manager), Mr. D. I. Evans (buyer), Mr. J. Traxler (managing director, Henley's Tyre & Rubber Co., Ltd.), Mr. S. J. Madden (sales manager of the Tyre Company), Mr. J. H. Roberts (secretary of Cable Research). Mr. A. J. Potter was unable to attend owing to ill-health. By request, no flowers were sent with the exception of a massive cross from the family and a large floral emblem from the directors and staff of W. T. Henley's Telegraph Works Co., Ltd., and Henley's Tyre & Rubber Co., Ltd.

Mr. F. Smith.—The death is reported from Shanghai of Mr. Frank Smith, representative of Messrs. C. A. Parsons & Co., Ltd., at the age of fifty-one. Mr. Smith had been with the company for thirty-five years in various capacities. He served his apprenticeship at the Heaton Works, and was head of the testing department before he was sent abroad. Four years ago he went to Australia as the company's representative, and last year he was transferred to Shanghai as representative for China and Japan. He leaves a widow and son who reside at Newcastle.

Mr. G. Shildock.—The death is announced at the age of sixty-five years of Mr. George Shildock, of Rugby, who was one of the pioneer electrical engineers in the Midlands. He commenced business at Birmingham about thirty-five years ago, and went to Rugby in 1906 to join the staff of the British Thomson-Houston Co., Ltd. In 1925 he resumed business in the town, and retired in October last.

Mr. J. B. Collier.—The death is announced at the age of 77 years of Mr. John Bruce Collier at Farnham, Surrey. He had resided in that town for thirty-five years, and until nine years ago carried on the business of the Electric & General Lighting Engineering Co. He was a pioneer of electricity in the town, and established his business before the introduction of a public supply.

Mr. S. D. Schofield.—The death is announced at the age of 63 years of Mr. S. D. Schofield, M.I.E.E., M.I.M.E., for the past two years sales engineer to the Wardle Engineering Co., Ltd., which occurred on March 11th at Manchester. Mr. Schofield was for many years on the staff of the Holophane Co.

Mr. H. S. Fox.—The death is announced at the age of sixty-four years of Mr. Henry Shoolbred Fox, chairman of G. J. Worssam, Ltd., engineers and coppersmiths, of Wenlock Road, N. He was an associate member of the Institution of Electrical Engineers.

Mr. C. L. De W. Reader.—The death is reported of Mr. C. L. De W. Reader, which occurred at Bognor on March 16th, at the age of 59, following an operation. Mr. Reader was at one time staff electrical engineer to the Maypole Margarine Works at Southall, and subsequently was responsible for the electricity distribution scheme since developed by the East Suffolk Electricity Distribution Co., and also for the inauguration of electricity supply to Hungerford (Berks.). He had been an associate member of the I.E.E. since 1903.

Mr. F. R. Hopkins.—Mr. Frederick R. Hopkins, manager of the Durban branch of the General Electric Co., Ltd., died on March 15th at the age of fifty-seven. Mr. Hopkins went to South Africa as an electrical engineer with Messrs. Hatfield & Co., about thirty-five years ago. On the retirement of Mr. Hatfield, he acquired the control of the business, and when the G.E.C. established its branch at Durban in 1921 he accepted an appointment as its first manager.

Mr. J. Jackman.—The death took place at Southborough on March 14th, at the age of fifty-nine, of Mr. James Jackman. Mr. Jackman went to Folkestone in 1898 in connection with the installation of electric lighting at the Wampach Hotel as a representative of a London firm of electrical contractors, and later went into partnership with Mr. W. R. Marchant, trading as electrical contractors, but the partnership was dissolved in 1913. He was appointed electrical inspector for the South-East area of Government camps and buildings, a position which he held until this service was abolished in 1919.

Mr. A. Hilleard.—The death is reported of Mr. Ambrose Hilleard, general district foreman in Birmingham of Callender's Cable & Construction Co., Ltd. Mr. Hilleard, who had been in the service of the company for forty-four years, went to Birmingham in 1890 with Mr. G. Barnard, Midland district engineer and manager, to start the laying of the first public electricity supply mains throughout the city streets. He also assisted with the laying of the first electric lighting mains in the City of London in 1891, and carried out, under Mr. Barnard's direction, work in Germany, and also a number of pioneer lighting, power, and tramway schemes in other towns in this country. The interment takes place to-day at Uplands Cemetery.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Westmorland & District Electricity Supply Co., Ltd.—Public company. Registered March 18th. Capital £10,000 in £1 shares. Objects: To take over and put into operation the Special Order made in respect of the borough of Appleby, the urban districts of Kirkby Lonsdale and Shap, the rural districts of East Westmorland and West Ward and part of the rural district of South Westmorland, the urban district of Carnforth, and part of the rural district of Lancaster. The directors are: G. L. Wates, Rowhill Grange, Wilmington, nr. Dartford (chairman, Johnson & Phillips, Ltd.), H. J. Sheppard, Lamorbey Park, Sidcup (managing director and secretary, Johnson & Phillips, Ltd.); C. Stewart, "Blantyre," Beaconsfield Road, Blackheath, S.E.3 (director, Johnson & Phillips, Ltd.), and F. M. Long, 7, Queen Anne Terrace, Cambridge (consulting engineer). Registered office: Columbia House, Aldwych, W.C.2.

Flash-a-Lite, Ltd.—Private company. Registered March 18th. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrically lighted signs for advertisement and other purposes, &c., in continuation of the business formerly carried on by F. Burns and H. Clouts as "Flash-a-Lite." The directors are: Frederick Burns, 11, Marble Arch, W.1, and two others. Registered office: Byron House, 85, Fleet Street, E.C.4.

Streamlite Electric Lamp Co., Ltd.—Private company. Registered March 14th. Capital, £100 in £1 shares. Objects: To carry on the business of dealers in and manufacturers of electric incandescent lamps and electrical accessories, &c. The subscribers are: A. Winfield, 131, Grant Road, S.W.11, and A. Kinge, 58, Montana Road, S.W.17. Solicitors: Philip Conway, Thomas & Co., 80, Rochester Row, S.W.1.

Northern Wireless & Electrical Manufacturing Co., Ltd.—Private company. Registered March 14th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers and repairers of, agents for and dealers in wireless sets, components and apparatus, electrical fittings, &c. The directors are: Wm. R. H. Thompson, Mayfield, Grange Villas, Wallsend, and J. Cummings, 18, The Grove, Gosforth, Northumberland.

Roberts (Stanmore), Ltd.—Private company. Registered March 15th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical contractors and wireless dealers formerly carried on by R. V. McLean as "Roberts," at 2, The Broadway, Stanmore, Middlesex. The directors are: Mrs. C. M. Nicholls, 22, First Avenue, Bushey; W. M. Bassadone, 105, Wentworth Road, Golders Green, N.W.11; and R. V. McLean, address not stated. Registered office: 2, The Broadway, Stanmore, Middlesex.

Beckett & Parker, Ltd.—Private company. Registered March 16th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers and manufacturers, &c. The subscribers are: E. H. Parker, 86, Great Brook Street, Birmingham, and Winifred C. Goode, 74, Station Road, King's Norton, Birmingham. Registered office: 157, Summer Lane, Birmingham.

Southex Distributors, Ltd.—Private company. Registered March 16th. Capital, £500 in £1 shares. Objects: To carry on the business of wholesale and retail wireless and electrical dealers, &c. The directors are: A. King, 27, Little Heath, Charlton, S.E.7, and A. E. Stevens, 100, Canberra Road, Charlton Park, S.E.7.

France's Electric, Ltd.—Private company. Registered March 17th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electrical, mechanical and automobile engineers and contractors, manufacturers of and dealers in electrical, mechanical and wireless goods, &c. The subscribers are: Wm. G. France and Mrs. Jane M. France, both of Willoughby House, Moseley Road, Bilston, Staffs.

Returns of Electrical Companies

Ringmer & District Electricity Co., Ltd.—Debenture dated March 1st, to secure £20,000 with a premium of 10 per cent. and all further advances, charged on company's undertaking and property, present and future, including uncalled capital. Holders: Johnson & Phillips, Ltd., Columbia House, Aldwych, W.C.2.

Suppliers Construction Co., Ltd.—Capital, £650,000 in £5 shares. Return dated December 14th, 1932. 128,630 shares taken up. £350,000 paid, £293,150 considered as paid. Mortgages and charges, nil.

Nevalight (1928), Ltd.—Capital, £5,000 in £1 shares. Return dated November 17th, 1932. All shares taken up. £5,000 paid. Mortgages and charges, nil.

Brownie Wireless Co. of Great Britain, Ltd.—A. J. Foster, 37, Walbrook, E.C., was appointed receiver and manager on March 8th, under powers contained in first mortgage debenture dated August 1st, 1928.

Steam Heat Conservation Co., Ltd.—H. M. Barton, Aldermans House, Bishopsgate, E.C.2, ceased to act as receiver and manager on March 9th.

Electriclocks and Radio, Ltd.—Satisfaction in full on March 10th of a series of debentures authorised by resolution dated January 9th, 1933, and registered January 28th, 1933, securing £300.

Johnson & Phillips, Ltd.—Satisfaction in full on February 14th, 1933, of trust deed securing 1st mortgage debenture stock, dated July 1st, 1921, and registered July 11th, 1921. (According to the register of mortgages, the trust deed registered July 11th, 1921, originally secured £350,000.)

Musselburgh & District Electric Light & Traction Co., Ltd.—Satisfaction to the extent of £1,700 on December 31st, 1932, of 5 per cent. debentures, authorised by resolutions dated November 13th, 1905, and April 8th, 1909, and registered May 12th, 1909, securing £90,000.

Electrical Trades Supply, Ltd.—Satisfaction to the extent of £1,250, on July 25th, 1932, of a series of debentures authorised by resolution dated May 9th, 1913, and registered May 15th, 1913. (According to the register of mortgages, the series of debentures registered May 15th, 1913, originally secured £1,250.) (Notice filed March 14th, 1933.)

Regentone, Ltd.—Capital, £10,200 in 100 "A" ordinary shares of £1, 400 "B" ordinary shares of 5s., and 10,000 7 per cent. preference shares of £1. Return dated December 15th, 1932. 100 "A" ordinary, 400 "B" ordinary, and 700 preference shares taken up. £900 paid. Mortgages and charges, nil.

Celestion, Ltd.—Debenture, dated March 1st, to secure £5,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: L. French, "Enfield," Coombe Lane, Kingston Hill.

Ferguson Battery Co., Ltd.—Capital, £3,000 in 5s. shares. Return dated January 13th, 1933. All shares taken up. £3,000 paid. Mortgages and charges, nil.

Palestine Electric Corporation, Ltd.—Issue on February 28th of £112,000 debenture stock, part of a series already registered.

St. Mary's (Scilly) Electricity Supply Co., Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £5,000.

British Electric Equipment Co., Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £3,000. The additional capital is divided into 2,000 7 per cent. cumulative preference shares of £1 each.

City Notes

The County of London Electric Supply Co., Ltd., held its annual meeting on March 21st, Sir Bernard Greenwell (chairman) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, March 17th, p. 400), the chairman said that the sales of electricity totalled 95,070,219 kWh, an increase of 18.6 per cent., and the number of consumers rose by 48,000 to 294,000. The expenditure on distribution was comparable with previous years, and indicated continued development. At the Barking power station they had four of the new boilers out of eight ready for steaming, and the first 75,000-kW set was ready for running up. The new plant would be available in good time for the winter load of this year. The working of the station last year was maintained without interruption, and dealt satisfactorily with a load of 210,000 kW. Some 65 miles of h.p. lines had been laid, and 307 miles of medium and l.p. distribution works constructed. The average rate obtained by their domestic consumers under the two-part tariff for the whole area of the company was 2.08d. per kWh. About 30,000 of their consumers had taken advantage of the assisted-wiring scheme. Extensions had been made to the street lighting business, and they were now investigating the latest examples of street lighting brought into practical use by the new electric discharge lamp. They had continued, with success, their penetration of the domestic field. The demand for electric water-heating had grown with such rapidity that they were now examining improved methods and prices for the benefit of their customers. The electric cooking load had grown just as rapidly. In the first two months of the current year the output was 19,103,036 kWh. above the corresponding period of 1931, an increase of 18 per cent. With regard to the associated companies, similar good results were reported, and these companies were pursuing the same policy of domestic development.

The Telephone & General Trust, Ltd., held its annual meeting on March 15th. Sir Alexander Roger (chairman) presiding. In presenting the report and accounts (ELEC. REV., March 17th. p. 401), the chairman said they had continued the policy of short-term borrowing during the year, and this had been employed profitably in advances to their associated telephone operating companies until such time as they permanently funded their capital requirements. Up to the present they had been able to turn over large sums in this direction and materially assist in development. The telephone companies in which the Trust was interested were progressing satisfactorily. These companies had embarked upon intensive canvassing campaigns in order to counteract the present depression. This policy was continued actively during the past year, and considerable success had attended their efforts. On the telephone operating side they had procured a supply of additional capital at rates which would enable their affiliated companies to expand their services to the public without the necessity of increasing rates to subscribers. This was the direct result of a period of cheap money.

The North-Eastern Electric Supply Co., Ltd., held its annual meeting on March 21st. Mr. R. P. Sloan (chairman), who presided, in presenting the report and accounts (ELEC. REV., March 17th, page 400), said the rate of obtaining new business during the past year was well maintained; the connections totalled 37,537 h.p., which showed a considerable increase over the previous year. The year under review was subject to the full effect of the price reductions in respect of domestic supplies, but they had obtained new business as a result of these reductions. Throughout the year there was little change in the general industrial position, though during the later months there were some slight signs of improvement. They substantially extended their domestic supply business, and exceeded their last year's record in the way of new connections. The increase in the number of new consumers of all classes during 1932 was 22,837, of whom 21,540 were domestic consumers. The outlook as regards the coal trade was brighter than it was twelve months ago, and as they were very large suppliers of electricity to collieries, both in Northumberland and Durham, any improvement in the output of coal was bound to be of benefit to them. As regards shipbuilding, the situation at the end of last year was at its lowest ebb. Since then the position had somewhat improved. There were also signs of some improvement in ship repairing. In the iron and steel industries the prospects were also better than they were, and they might reasonably anticipate that these industries would require a greater supply of electricity from their system than they had been taking in the past few years. Furthermore, there were definite signs of improvement among miscellaneous trades. As regarded domestic and similar supplies their prospects were better than they had ever been. The rate of connection of new consumers of all classes throughout last year averaged 439 per week. Since the commencement of the current year the rate of new connections, although so far not up to last year's average, was very satisfactory. From the general trend of events in more recent times they could look forward to the future with more confidence than had been possible for several years past. In connection with the standardisation of frequency under the North East England scheme, the new 50-cycle power station at Dunston was brought into commercial operation last January, and the means were now available for providing supply at this frequency throughout the greater part of their area. The orders which had already been placed, from their office, in connection with the N.E. England scheme at the present time exceeded £4,500,000, of which a very considerable portion had been placed within their own district. They had also reconstructed 53,500 h.p. of plant at the North Tees power station, so that it could produce electrical energy at the standard frequency. While good progress had been made with this work, it would, however, still take several years before the whole of it was completed.

The Marconi International Marine Communication Co., Ltd.—At the general meeting held on Tuesday Mr. F. S. Hayburn (deputy managing director), who presided, after expressing regret at the illness of the chairman, the Rt. Hon. F. G. Kellaway, presented the report and accounts (see last issue, page 401), and said that it was difficult to find a suitable term for the depressed state of British shipbuilding during the past year; at one time 30 per cent. of the ships in which the company was interested were laid up. Furthermore, while normally there were some 200 additional ships of 1,600 tons and over requiring new wireless installations, in 1932 there were only twenty-one vessels fitted. Many ships were also being sold to foreigners or for breaking up. There were, of course, other opportunities for marine wireless business besides main installations for new ships, and of the total business of all kinds available the company secured 88 per cent. It was gratifying to report that the company's subsidiary, the Marconi Sounding Device Co., Ltd., had in under two years secured 547 orders for its "Echometer" type of sounding device, 350 of these orders being in respect of British trawlers. Although it was only in January, 1932, that the new service was introduced whereby the complete electrical output of new ships as well as the supervision, maintenance, and repair of existing installations was undertaken, already nearly 130 ships' installations were under the care of the company's electrical service department. In co-operation with the G.P.O. the company had inaugurated a system of coastal wireless telephone stations so that coasting vessels might be certain of communicating with the shore by telephone at any time. Eleven of these stations were erected between May and October and 144 small wireless telephone installations, which could be operated by any member of the crew, had been fitted to vessels. The report and accounts were unanimously adopted.

The Scottish Power Co.—The annual meeting was held on March 17th, when Mr. G. Balfour (chairman), who presided, referred with regret to the death of Mr. H. Brown, chairman of the company for many years. He said that in spite of the decrease in the demand of old customers, they were able to show a reasonable increase in the sales of electricity owing to new business. An extensive canvass was made of every burgh and village newly connected, and a demonstration and sales van was sent round the scattered villages. They were gradually educating the public in the country districts to the benefits of electricity in the home and on the farm. A special Order applied for by the Grampian Co. to enable it to supply electricity in five additional counties and part of another county had been granted, and it had now actively embarked on the development of this area. Their subsidiary undertakings

covered the whole of fourteen Scottish counties and parts of six others, representing an area of 11,106 sq. miles. The work on the Tummel power station was proceeding satisfactorily, and the plant was due to be put into operation on January 1st next. Large additions were made to the transmission system during the year, and new consumers connected to the various subsidiary companies' services numbered 3,834, making a total of 30,947. The connected load increased by 9,100 kW to 115,600 kW, and the sales of electricity by 5,800,000 kWh to 142,800,000 kWh.

The British Thomson-Houston Co., Ltd., reports a profit for the year ended December 31st last of £392,015, as compared with £450,047 in the preceding year; to this is added £221,265 brought in, making £631,280. After deducting debenture interest, &c., it is proposed to appropriate £146,992 for depreciation, &c., and to pay an ordinary dividend of 4 per cent. (against 5 per cent.), leaving £227,795 to be carried forward. The report states that owing to the continued financial and trade depression throughout the world, the output from the company's factories and the amount of new business received were both less than in the previous year. Orders in hand at the end of the year also showed a decrease. Redemption had been duly effected of the amount of 4½ per cent. and 6 per cent. debenture stock required in the respective trust deeds. Meeting: March 27th.

The Edison Swan Electric Co., Ltd., reports a profit for the year ended December 31st last of £73,365, as compared with £77,762 in the preceding year. After deducting debenture interest, &c., and adding £10,778 brought in, a total of £29,872 is available. The ordinary dividend is maintained at 6 per cent. and £10,886 is carried forward. Sir Edward P. Strickland has been appointed to the board.

The Lancashire Electric Light & Power Co., Ltd., reports that the trading profit of its subsidiary companies plus interest receivable was £299,296 for 1932, as compared with £282,225 in the preceding year; to this is added £4,307 brought in, making £303,603. After providing for income tax, depreciation, &c., the balance paid over to the Electric Light & Power Co., plus management fees and sundry receipts, amounts to £195,753. The company's net balance is £138,045, as compared with £168,433 in the preceding accounting period of nine months, and with £44,438 brought in there is a total of £182,483 available. The ordinary dividend is maintained at 7 per cent., and £8,360 is carried forward. The electrical energy purchased increased from 263,517,515 kWh to 287,305,622 kWh, but the maximum load fell from 130,257 to 126,190 h.p. The connections rose from 159,630 to 165,280 h.p. The report states that the subsidiary companies' domestic business continued to expand at a satisfactory rate, but the power consumption was affected by industrial disturbances. During the year considerable extensions were made to the mains and distributors of the operating companies. The Central Electricity Board's North-West England scheme has not yet come into operation, but it is expected that the company's stations will be connected to the grid during the current year. Meeting: March 23rd.

The Mersey Power Co., Ltd., held its annual meeting on March 21st, when Mr. H. J. Falk (chairman), who presided, said the length of their cables was 348 miles, of which forty-eight miles were added last year. They had 106 sub-stations, of which twelve were constructed last year. The new switchhouse was completed. The number of consumers at the end of the year was 11,136, an increase of 2,938, as compared with an increase of 1,472 in the preceding year. This higher rate of growth was due to the new two-part tariff and assisted wiring, and the effective instruction in domestic uses given by their lady demonstrator. While the growth of domestic consumption was welcome, their most important demand was from the large number of various industries situated on Merseyside. The most comprehensive view of this demand was obtained from the statistics of the Mersey and West Lancashire Electricity District, which covered nine centres of supply. Their company sold in its area 400 kWh per head, while the next figure on the list was only 289 kWh, and others declined to a minimum of 57. That large consumption showed both the potentialities of their area and their vitality in fulfilling the demand.

Pinchin, Johnson & Co., Ltd., held their annual meeting on March 21st. Mr. E. Robson (chairman), who presided, said their home trade had held up remarkably well. Their output increased by many hundreds of tons, but owing to the lower price averages obtained, the monetary value of sales was less. The business of their subsidiaries in India, Australia, and Argentina produced substantially increased profits. They had continued their policy of extending and reconstructing their technical and manufacturing facilities, and this programme was now practically completed. With regard to the future, their position at the moment gave them the fullest confidence, and with any modest improvement in the world situation they expected to find a reflection of such an improvement in their own business.

Waygood-Otis, Ltd., report a net profit for 1932 of £89,050, as compared with £77,859 in the preceding year. A final ordinary dividend of 2½ per cent. is paid, making 15 per cent. for the year (against 10 per cent.), and in addition a bonus of 10 per cent. is proposed (same). The pensions reserve receives £6,000 and £26,245 is carried forward (against £24,695 brought in). The report states that trading conditions have been difficult during the year, but although profits on individual units are small, the company has carried over from past years a satisfactory volume of lift and escalator work. During present-day conditions service and repair work has expanded.

The Midland Electric Corporation for Power Distribution, Ltd., reports a net profit for 1932 of £118,162 (against £140,164 in 1931). A sum of £27,030 is brought in, and after placing £29,200 to depreciation, and £20,000 to reserve, it is proposed to pay a final ordinary dividend of 5½ per cent., making 8 per cent. for the year (same), leaving £25,992 to be carried forward. Meeting: March 28th.

Waste Heat & Gas Electrical Generating Stations, Ltd., reports that for 1932 there was a net profit of £28,678 (against £29,714 in 1931). The dividend is maintained at 8 per cent. and £26,727 is carried forward.

The Anglo-Portuguese Telephone Co., Ltd., reports a net profit for 1932 of £70,676 (against £58,537 in 1931), which with £41,340 brought in makes £112,015. General reserve receives £20,000 and it is proposed to pay a final dividend of 5 per cent. on the ordinary shares, making 8 per cent., and 8 per cent. for the year on the "A" ordinary shares, leaving £40,050 to be carried forward.

British Insulated Cables, Ltd., reports a profit on trading, including dividends on investments, &c., of £589,275 for 1932, as compared with £589,610 in the preceding year to which is added £290,258 brought in, making £879,533. After deducting debenture interest, &c., and appropriating £100,000 to depreciation on buildings, plant, machinery, &c., and placing £120,000 to reserve, it is proposed to pay a final ordinary dividend of 10 per cent., making 15 per cent. for the year (same), leaving £301,123 to be carried forward. Meeting: Liverpool, March 28th.

The Morgan Crucible Co., Ltd., reports trading profits for 1932 of £214,519, as compared with £145,988 in 1931, and a net profit of £170,504, against £193,344, the decrease being due to the larger income-tax charge, and to the fact that in the last accounts a credit of £65,224 arose in respect of U.S.A. customs duties refunded. It is proposed to pay a final dividend of 6d. per share on the deferred ordinary shares, making 10½d. per share for the year, and to carry forward £917.

Baird Television, Ltd.—At a meeting of shareholders held on March 20th resolutions were passed authorising an increase to £875,000 in the capital by the creation of 200,000 new "A" ordinary shares of 5s. each. Sir Harry Greer (chairman) said the new capital was sufficient to see them through another two and a half years at least.

The British Aluminium Co., Ltd., reports a net profit for 1932, including an amount brought in, and after providing for debenture interest, &c., setting aside £50,000 for depreciation reserve and £10,000 for the staff benefit fund, of £162,031, as compared with £159,923 in 1931. The ordinary dividend is maintained at 5 per cent., and £51,980 is carried forward.

The Cambridge Electric Supply Co., Ltd., reports a profit for 1932, including an amount brought forward of £40,990. It is proposed to pay a final dividend of 5 per cent. on the ordinary shares, making 8 per cent. for the year, and to carry forward £2,863.

The Altrincham Electric Supply, Ltd., reports a profit of £30,526 for 1932, against £27,333 for 1931, plus £2,762 brought in. The final ordinary dividend absorbs £1,000, and the dividend on the deferred shares £1,000 (same), leaving £5,404 to be carried forward.

The Llanelly and District Electric Supply Co.—The subscription list of the issue of 250,000 ordinary £1 shares, opened on March 15th, was closed on the same day owing to over-subscription.

The North Somerset Electric Supply Co., Ltd., has declared a dividend at the rate of 7 per cent., less tax, for the year 1932 on the ordinary shares.

The Constantinople Telephone Co. reports a surplus of £T.1,475, to which is added £T.7,651 brought in, making £T.9,126 which is carried forward.

The Greengate & Irwell Rubber Co., Ltd., has announced a final dividend of 1s. on the 16s. ordinary shares, making 1s. 6d. for the year (against 1s. 9d. for 1930-31).

The Anglo-American Telegraph Co., Ltd., has declared a quarterly dividend of 15s. per cent. on the ordinary shares (same).

Stocks and Shares

TUESDAY EVENING.

THE British Government has made a new excursion into the realm of national finance, and the Friday in this week will witness what success the latest development is likely to attain with the investing public. A new issue of 2½ per cent. Conversion bonds has been placed on tap; the stock is offered for tender. The effect has been to stiffen still further the strong tendency shown by investment securities as a whole, and to emphasise the scarcity of floating supply of such issues. A newcomer has but to offer sound security for its stock to be readily snapped up if the latter is issued at any price that appears to be reasonable. Indications point to the probability that the credit of the British Government, standing, as it does at present, on a 3½ to 3½ per cent. basis, will shortly be raised to a 3 per cent. level.

Home Railway Stocks

The feature in the list of Home Railway stocks is the jump of 4½ points in Metropolitan Districts. This took the price to 60, and, in sympathy, Underground Electric ordinary shares rose a florin to 19s. The London Passenger Transport Bill has concluded its Committee stage in the House of Lords, and the Committee accepted an amendment fixing the appointed day for the Bill to come into operation as July 1st next. This is, of course, assuming that the Bill will become law before the Easter recess. At the present prices of District and Underground Electric ordinary shares, the equivalent of the London Transport "C" stock works out to about 65, which in some quarters is regarded as excessive for the time being.

Speculation is, however, playing a part in the market, though at 60 a certain amount of District ordinary stock was tempted out on behalf of holders who think that the present level represents, approximately, as much as the stock is worth under current conditions. There is, of course, the chance that the new Transport "C" stock may earn a dividend sufficiently substantial to justify a higher price. Of the other stocks affected by the Bill, London United Tramway debenture remains steady at 73½, while London and Suburban Traction

preference are 1s. 6d. up at 14s. 6d. Business was marked the other day in the London United Tramway 5 per cent. preference shares of £1 each. These changed hands at 3s. 6d. London and Suburban Traction ordinary are being negotiated on the basis of 2s.

The American Outlook

President Roosevelt entered upon his term of office at White House amid mild enthusiasm and the waving of a good many flags of faith and hope. Prices of American stocks and shares went better. The President's firmness of attitude in regard to his banking policy commanded general respect. His first fortnight in office is now called, however, a "honeymoon," and he has returned, as it were, to humdrum business of a type whose difficulties will demand both shrewdness and patience to effect a satisfactory solution. Prices are maintaining their ground with a fair amount of steadiness, this applying to the Canadian as well as to the United States stocks and shares. In the utility group, American Telephone & Telegraph is better at 150, because the price went ex the 2¼ dollars dividend on March 16th. International Telephones are unchanged at 10, which is, by the way, the same price as that at which Brazilian Tractions stand. Consolidated Gas of Baltimore at 80 was recently ex the dividend of 80 cents. Shawinigan Water & Power common is quoted at 14½, Pennsylvania Water & Power common at 82½, Power Corporation of Canada at 9. In the Mexican issues, no changes have occurred during the current week, and amongst Colonials, Victoria Falls ordinary shares continue at £4, a position which they took up about a month ago, and from which the price has not budged more than sixpence during the interval.

International Automatic Telephone shares are flat, the price falling nearly 5s. at one time, but recovering to 34s. The deferred shares are quoted at the same price. The company has declared its usual dividend, making 10 per cent., but this time there is no 2½ per cent. bonus, the absence of which was unexpected.

Cables and Wireless

The monthly index number published by Imperial & International Communications is 71.7 for February, which goes against 69.9 in the previous month, but compares with 82.9 twelve months ago. The index started at 96 in January, 1930, and went down to 61.8 in August, 1931. The lowest last year was 63.2 in July. The February figures for this year are regarded as being tolerably satisfactory. The prices of the stocks are a trifle better. Globe Telegraph & Trust ordinary are quoted at 12, ex 1s. dividend, and the preference at 11⅞ are ex 3s., the deductions having been made on Monday last. Marconi Marines, after being up to 30s., reacted to 28s. 9d., which leaves the price unchanged on balance. Anglo-American Telegraph preferred stock at 101½ is ex dividend.

Home Electricity Supply

A number of the principal shares in the Home Electricity supply group are now ex dividend. This has made little net change to the quotations, some of which are left, indeed, at the figures which obtained before the deduction was made. Business is quiet, and prices are steady. In Llanelly and District new ordinary shares, dealings started at the beginning of the week, the price being about par. North Metropolitan ordinary are better at 61s. There has been an inquiry for Electrical Finance & Securities, and on this the price strengthened to 59s. 6d. West Gloucestershire ordinary remains dull at 56. Hendon Electric ordinary at 96s. 6d. are ex dividend. There are on offer 2,000 Shropshire & Worcestershire 6 per cent. preference at 27s. 6d., 2,000 Scottish Power sixes at 28s. 4½d., and 5,000 Lancashire Power 6 per cent. tax free preference at 34s. 3d.

Of the debenture stocks available, mention may be made of £5,000 each of London Power fours at 104¾, Midland 4 per cent. at 104, General Electric 4½ per cent. at 105¾, and Edmundson's 4 per cent. at 100½. In the case of all but the last-named stock, the issues can be bought free of stamp and fee. Another free of stamp stock on offer is £5,000 Perak River Hydro 4 per cent. debenture at 99⅜. Tokyo Electric 6 per cent. bonds advanced from 71 to 73.

Manufacturing and Equipment

British Insulated ordinary are firm at 67s. 6d., and Henleys at 6-7/8 show a small improvement. Crompton Parkinson ordinary eased off to 21s. 6d., but on the other hand the 8 per cent. preference at 32s. 6d. show a gain of half a crown. Telegraph Constructions are a better market at 18s. 9d. There has been a fairly steady demand for shares in this particular group. Telephone Properties are better at 21s. 3d., Telephone Rentals and Telephone Manufacturing shares both show improvements at 6s. and 3s. 6d. respectively. Anglo-Portuguese Telephone ordinary advanced to 25s., and the company's 5½ per cent. debenture to 105¼. The debenture stocks in this market, as in that for cable stocks, are generally a point or so higher, nor does the putting up of the prices have the effect of bringing in the stock for which prospective purchasers press. Lissen new 8 per cent. preference, which came out at 23s., are quoted at 21s. 9d. middle.

Amongst iron and steel shares, Babcocks at 37s. 6d. show a slight decline, and Vickers are duller at 6s. 6d. Shares connected with the armament industry are generally easier, owing to the peace proposals which have lately been put forward from Rome and elsewhere. The rubber market is as quiet as ever.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Mar. 21.	Rise or Fall.	Yield p.c. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	72/6	—	4 2 8
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb.	Stock	4½	4½	108	—	4 3 4
Charing Cross Ordinary	1	8½	8½	33/6	—	4 3 7
Chelsea	1	8⅛	8⅛	33/-	—	4 4 10
City of London	1	10	10	34/6	—	4 1 2
Clyde Valley	1	8	7	35/-	—	4 0 0
County of London	1	11	10½	52/6	+6d.	4 0 0
Edmundsons' 7% Pref.	1	7	7	30/6	—	4 11 10
Elec. Dis. Yorkshire	1	9	9	43/9	—	4 2 2
Elec. Supply Corporation	1	11	11	62/6	—	3 10 3
Kensington Ordinary	1	8	8	33/-xd.	—	4 4 10
Lancs. Light and Power	1	6½	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	108	—	4 3 4
London Electric	1	9	9	32/-xd.	—	4 7 6
Metropolitan	1	10	10	48/9xd.	—	4 2 0
Midland Counties	1	7	7	34/6xd.	—	4 1 2
Mid. Elec. Power	1	8	8	38/9	—	4 2 6
North Eastern Electric Ordinary	1	6	6	29/6	+6d.	4 1 4
Do. 7% Pref.	1	7	7	32/-	—	4 7 6
Northampton	1	10	10	50/-	—	4 0 0
Notting Hill 6% Pref.	10	6	6	13½	—	4 10 7
North Met. Elec. 6% Pref.	1	6	6	30/-	—	4 0 0
St. James' and Pall Mall	1	8	8	32/6	—	4 6 2
Scottish Power	1	8	8	35/-	—9d	4 11 5
South London	1	8½	8½	33/-	—	4 4 10
Urban Ordinary	1	7	7	37/6	—	3 14 0
Westminster Ordinary	1	8½	8½	32/6	—	4 6 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 1
Yorkshire Elec.	1	8	8	41/3	—9d.	3 17 8
Home Rails.						
Central London Ord. Assented	Stock	4	4	84½	—	4 14 7
Metropolitan	„	3½	2½	71	+2	2 4 6
Do. District	„	5	4½	60	+1⅛	5 16 8
Underground Electric	1	8	7	19/-	+2/-	4 14 9
Telegraph and Telephones.						
American Tel. & Tel.	$100	9	9	150	+1½	6 0 0
Anglo-Am. Tel. Pref.	Stock	6	6	101¼xd.	—	5 18 5
Do. Pref.	„	1½	1½	25	—	6 0 0
Cables & Wireless 5½% Pref.	„	5½	2¾	82½	+1	3 7 6
Do. A 7½% Ord.	„	—	Nil	27	+½	—
Do. B Ord.	„	—	Nil	10½	—	—
Globe Tel. and T. Ord.	10	8½	Nil	12xd.	—	—
Do. do. Pref.	10	6	6	11¼xd.	—	5 1 2
Great Northern Tel.	10	20	20	27½	—	7 5 6
Marconi-Marine	1	15	10	28/9	—	5 4 4
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0
Home and Foreign Trams, Etc.						
Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	6	—	—
British Electric Traction Def. Ord.	„	5	5	235	—	—
Do. do. Pref. Ord.	„	8	8	135	-1	5 18 8
Brazil Traction	100	—	—	10	+½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	14/6	+1/6	—
London United Tram Deb.	Stock	4	4	73½	—	5 8 10
Mexico Trams, 5% Bonds	—	5	5	41½	—	12 1 0
Mexican Light Common	100	Nil	Nil	7½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	7½	—	6 14 3
Victoria Falls Ord.	1	15	15	4	—	3 15 0
Yorkshire (West Riding)	1	Nil	Nil	5/6	—	—
Manufacturing Companies.						
Assoc. Elec. Ord.	1	6	4	17/6	—	4 11 5
Do. Pref.	1	8	8	30/-	—9d.	5 6 8
Babcock & Wilcox	1	14	14	37/6	—6d.	—
British Aluminium Ord.	1	10	5	21/6	—6d.	4 1 8
British Insulated Ord.	1	15	15	67/6	—	4 8 4
Brush Ord.	Stock	5	Nil	50	—	—
Callender's	1	15	15	2 1/16	+1/16	5 2 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	30	24	21/6	—6d.	5 2 4
Do. 8% Pref.	1	8	8	32/6	+½	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	12/-	—	—
Enfield Cable Ord.	1	25	25	4¾xd.	—	5 14 1
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	15/-	—	—
Ever Ready	5/-	35	35	26/9	—	6 10 1
Ferranti Pref.	1	7	7	24/-	—	5 18 0
G.E.C. Pref.	1	6½	6½	29/9	—	4 7 5
Do. Ord.	1	10	8	41/3	+6d.	3 17 5
Henley's	1	30	30	6 7/8	—	4 17 1
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	1	—	5 0 0
Siemens Ord.	1	7½	7½	26/3	—	5 14 3
Telegraph Construction	£1	Nil	Nil	18/9	+1/8	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1931

17850. "Electrolytic condensers." S. Ruben. June 19th, 1930. (388395.)

20324. "Protective arrangements for electric power supply systems or apparatus." General Electrical Co., Ltd., and W. Wilson. July 15th, 1931. (388414.)

21162. "Electric motors." Schick Dry Shaver Inc. August 19th, 1930. (388416.)

22969. "Electric welding." International General Electric Co., Inc. August 15th, 1930. (388390.)

22981. "Synchronising television." R. S. Clay. August 14th, 1931. (388370.)

23275. "Television and the like systems." Gramophone Co., Ltd., and G. E. Condliffe. August 18th, 1931. (388404.)

23373. "Distribution of electrical transmissions." J. J. Numans. August 19th, 1931. (388399.)

23647. "Quick break electric switches." C. H. Parsons, Ltd., and G. B. Handley. August 22nd, 1931. (388401.)

23841. "Television systems." Electrical Research Products, Inc. August 26th, 1930. (388422.)

23871. "Alternating current signalling systems." L. E. Ryall. August 25th, 1931. (Cognate application 28705/31.) (388424.)

23978. "Electric lamps." J. Lucas, Ltd., and W. H. Egginton. August 26th, 1931. (388428.)

24107. "Systems for the telephonic distribution of news, amusement, and the like, and apparatus for use in such systems." Standard Telephones & Cables, Ltd., and J. H. Herink. August 27th, 1931. (388436.)

24117. "Coil-winding machines." Automatic Electric Co., Ltd., and S. Hobson. August 27th, 1931. (388439.)

24691. "Electrical sound reproducers." Magnavox Co. September 2nd, 1930. (388448.)

25585. "Protective gear for alternating current systems." T. W. Ross and Associated Electrical Industries, Ltd. September 11th, 1931. (388454.)

26582. "Electric switches with automatic tripping means." J. P. Keith and Power Equipment Co., Ltd. September 23rd, 1931. (388460.)

26766. "Electrolytes." Aerovox Wireless Corporation. December 9th, 1930. (388462.)

27378. "Metal-vapour electric discharge valves." Akt.-Ges. Brown, Boveri et Cie. February 2nd, 1931. (388465.)

27954. "Electric dry batteries." J. J. Pala. October 8th, 1931. (388471.)

28289. "Auto-transformers having a variable transformation ratio." Allen West & Co., Ltd., and F. Bergmann. October 12th, 1931. (388473.)

28469. "Mountings for fuses for overhead electrical cables, and apparatus for the moving and placing of such fuses." H. J. Aylott. October 13th, 1931. (388474.)

29139. "Measurement of transmission levels on telecommunication circuits." Lignes Télégraphiques et Téléphoniques. November 14th, 1930. (388477.)

29155. "Fine adjustment drive for use on motor driven winches, but more particularly electric pulley blocks." Demag Akt.-Ges. November 26th, 1930. (388478.)

29393. "Systems for relaying and distributing radio programmes." P. P. Eckersley, W. T. Sanderson, and R. Blackburn. October 22nd, 1931. (388480.)

31126. "Electromagnetic step-by-step switches." General Electric Co., Ltd., C. C. Puckette, and J. Eriksen. November 10th, 1931. (388491.)

31991. "Moving-coil ohmmeters or the like." Evershed & Vignoles, Ltd., and C. E. Perry. November 18th, 1931. (388497.)

32334. "Smoothing of rectified alternating current or pulsating direct current." Edison Swan Electric Co., Ltd., and J. H. D. Ridley. November 21st, 1931. (388.501.)

32427. "Methods of and apparatus for starting alternating current motors." British Thomson-Houston Co., Ltd. November 21st, 1930. (388502.)

33328. "Electrical contacts for switches, circuit breakers, connectors, and the like." G. E. Whitehead and Whitehead's Electrical Inventions, Ltd. December 1st, 1931. (388509.)

33545. "Traffic beacons." E. D. Coates. December 3rd, 1931. (388510.)

34748. "Wireless receiving apparatus." General Electric Co., Ltd., N. R. Bligh, and N. L. Harris. December 15th, 1931. (388516.)

35110. "Arc rupturing devices for electric circuit breakers." Westinghouse Electric & Manufacturing Co. January 24th, 1931. (388519.)

35264. "Television process." M. Von Ardenne. December 23rd, 1930. (388524.)

36064. "Alternating current relay apparatus." R. C. Graseby. December 31st, 1931. (Addition to 367433.) (388530.)

1932

111. "Reception of radio telephony, telegraphy, or television." K. D. U. Rogers. January 2nd, 1932. (388532.)

639. "Electric totalisator systems." Siemens Bros. & Co., Ltd., and J. H. Broome. January 8th, 1932. (388538.)

2616. "Galvanic batteries." Oldham & Son, Ltd., and W. D. Wilde. January 28th, 1932. (388550.)

2779. "Liquid-break electric switches." S. Ruppel. January 29th, 1931. (388554.)

3625. "Light generating vacuum tubes." U. W. Doering. February 11th, 1931. (388560.)

5400. "Apparatus for recording distances or depths by the echo-sounding method." Submarine Signal Co. September 4th, 1931. (388567.)

5851. "Moving coil a.c. voltage regulators." Ferranti, Ltd., and G. L. Porter. February 26th, 1932. (388571.)

7290. "Tumbler electric switches." S. Davis and E. J. L. Delfoss. March 11th, 1932. (388578.)

8267. "Methods of controlling low-pressure gaseous discharge rectifiers." Siemens-Schuckertwerke Akt.-Ges. March 26th, 1931. (388583.)

10066. "Device for actuating and locking in its 'off' position a rotatable control member, such as the plug of a cock or an electric switch." W. H. Featherstone. April 8th, 1932. (Cognate application 21612/32.) (388591.)

10822. "Smoothing means employed in electro-deposition." H. Kuppel and L. Simeant. April 15th, 1931. (388595.)

12197. "Back-coupling connection for thermionic valve amplifiers." Dr. S. Loewe and Dr. P. Kapteyn. April 29th, 1931. (388600.)

12625. "Radio receivers." Marconi's Wireless Telegraph Co., Ltd. May 1st, 1931. (388601.)

13245. "Submersible units comprising electric motors and transformers." M. Surjaninoff. May 7th, 1931. (388604.)

14162. "Ignition magneto-electric machines." A. Lindberg. May 18th, 1932. (388608.)

14293. "High tension electric circuit interrupters." British Thomson-Houston Co., Ltd. May 19th, 1931. (388613.)

15318. "High tension electric switches." British Thomson-Houston Co., Ltd. May 29th, 1931. (388620.)

16135. "Television method." M. Von Ardenne. June 19th, 1931. (Addition to 8932/32.) (388623.)

16301. "Telegraph systems with repetition of the signals." A. Bakker and H. C. A. Van Duuren. June 11th, 1931. (388625.)

16811. "Devices for wave band switching for radio receiving apparatus." F. M. Frederiksen. September 3rd, 1931. (388632.)

17082. "Methods of making metal to be used in electric discharge or vacuum devices." British Thomson-Houston Co., Ltd. July 25th, 1931. (388634.)

21302. "Devices comprising an electric luminous discharge tube." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 19th, 1931. (388665.)

21877. "Locomotives of the Diesel electric type." Sulzer Frères Soc. Anon. April 18th, 1932. (388669.)

24662. "Suspension insulators for electric transmission lines." H. G. C. Fairweather (Compagnie Générale d'Electro Céramique). September 5th, 1932. (388681.)

25186. "Electron discharge tubes or thermionic valves." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 30th, 1931. (388684.)

25889. "Sewing machine driven by an electromotor." I. Gonyk. September 19th, 1931. (388688.)

26815. "Electric impulse generator." English Electric Co., Ltd., J. E. Calverley and R. D. Ball. September 27th, 1932. (388694.)

27377. "Mounting of electric lights on sewing machines." Jones Sewing Machine Co., Ltd., and J. Hall. October 3rd, 1932. (388695.)

32303. "Wireless position indicating devices for aircraft." British Thomson-Houston Co., Ltd. November 16th, 1931. (388714.)

1933

77. "Locomotives of the Diesel electric type." Sulzer Frères Soc. Anon. February 27th, 1932. (Divided application on 8609/32.) (388717.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 15th:—

The Bustler (lettering and design). No. 528355. Class 6. Electric vacuum cleaning and floor polishing machines, hair drying machines, blowing machines, and electric motors and fans.—C. H. Twigg, trading as the Electric Domestic Appliance Co., 6, Kingstanding Road, Perry Barr, Birmingham.

Abtex. No. 537802. Class 8. Electrically illuminated advertising signs.—A. Becker, 21, Hocroft Avenue, N.W.2.

Charlebond. No. 539046. Class 8. Electric cables.—Société des Ateliers de Constructions Electrique de Charleroi, Brussels. (British representatives: Feeny & Feeny, 73a, Queen Victoria Street, E.C.4.)

Scotram. No. 538863. Class 13. Electric lamps (ordinary).—Robert S. Guthrie, trading as R. S. Guthrie & Co., 4, Castle Terrace, Edinburgh.

Lewee. No. 537514. Class 18. Electric and gas heating apparatus.—George Skey & Co., Ltd., Watling Street, Wilnecote, near Tamworth, Staffs.

A misprint occurred in connection with the trade mark applied for by the Robert Bosch Co. referred to in our last issue, the mark being "Pyranit," not "Byranit."

Synthetic-resin Bonded Boards

A draft British Standard Specification for Grade I Synthetic-resin Bonded Paper Board is available. This Specification is supplementary to B.S.S. No. 316, issued in 1929, which covered Grade II material. The outstanding properties of the grade covered by the new Specification are low water-absorption, high resistivity, low dielectric loss, and good machining properties. Consequently this grade, rather than the Grade II material, should be used on apparatus when it is important that high insulation shall be maintained under severe conditions of atmospheric humidity. The properties for which limiting values are set in the Specification include flatness, tolerances on dimensions, density, electric strength, surface breakdown in air, tensile strength, compression strength, shearing strength, water absorption, machining tests, &c. The methods developed by the Electrical Research Association for testing these properties are fully described.

Copies of the draft Specification (reference C.C. (EL) 9093) are available to readers, whose co-operation in submitting criticism is invited, and may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 1s. 2d., post free.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Addiscombe (SURREY).—Houses (55), Michael Road; P. Richardson, 139, Wickham Road. Houses (20), Woodside Green; J. H. Martin, 17, Grant Road.

Airdrie.—Houses (132); burgh surveyor.

Ayr.—Houses (£23,555); burgh surveyor.

Barnsley.—Church (electrical installation); Jackson & Fix, architects, 1, Harrison Road, Halifax.

Bebington and Bromborough.—Houses (400); U.D.C. surveyor.

Bedfordshire.—School, Harrold, for County E.C.; J. B. Graham, clerk, Bedford.

Beverley (YORKS).—Houses (40), Cherry Tree Lane site; borough surveyor.

Bexley Heath.—Cinema and shops, Broadway; J. W. Ellingham, Ltd., builders, Dartford.

Bideford (DEVON).—R.C. School, Stella Maris Convent; managers.

Birkenhead.—Central school, Rock Ferry; R. W. Johnston, education architect.

Birmingham.—R.C. church near Lichfield Road, Sutton (£12,000); Harrison & Cox, architects, Colmore Row.

Boston.—Houses (68); R.D.C. surveyor.

Brampton (CUMBERLAND).—Additions to institution for the Management Committee of the Cottage Hospital; S. W. B. Jack, Lloyds Bank Buildings, Carlisle.

Bridlington (YORKS).—Branch premises for Montague Burton, Ltd.; W. & A. Forsdike, Ltd., builders, St. Mary's Road, Sheffield.

Brighton.—Houses (34), Carden Avenue Estate; Braybons, Ltd. Cinema, Gloucester Place; Astoria (Brighton), Ltd. Offices and flats, Russell Square; Moore of Brighton, Ltd.

Bromsgrove.—Extensions, Bromsgrove Cottage Hospital (electrical installation); G. C. Gadd, architect, Town Hall Chambers.

Bury St. Edmunds.—School, Grove Park (£15,500), for E.C.; W. H. Mitchell, architect.

Carlisle.—Aerodrome; Air-Commodore Pitcher and Capt. McClure.

Cheltenham.—Houses (32); Cutler & Sysum, builders.

Chester-le-Street.—Houses (75); M. Wilson, architect, Council Offices. Shopping arcade, Front Street; W. Norman, builder, West Lane.

Croydon.—Houses (28), Cypress Road; Martin & Saunders, Auckland Road, S.E.19. Houses (29), Devonshire Way; Gower Builders (London), Ltd. Boiler house and plant for hospital (£8,268); R. Durtnell & Sons, Ltd., Oxted.

Darlington.—Methodist chapel (£3,000), Park Street; J. Clayton, architect, 44, High Row Chambers.

Dartford.—Houses, Darenth (78) and Swanley (64); R.D.C. surveyor.

Dawley.—Houses (38), Malinslee Estate; J. H. T. Hickman, U.D.C. architect, 1, Market Street, Wellington, Salop.

Douglas (ISLE OF MAN).—Houses (150), Pulrose; borough surveyor.

Dudley.—School, Blower's Green (£30,246); director of education.

Dunfermline.—High school (£95,000); master of works, Education Committee, Kirkcaldy.

East Suffolk.—School, Wickham Market (£9,458); H. C. Greengrass & Sons, builders, Norwich.

Eccles.—Elementary school, Winton, for E.C.

Edinburgh.—Rebuilding theatre for the Edinburgh Palladium, Ltd.; J. Jerdan & Sons, architects, 12, Castle Street.

Ellesmere (SALOP).—Houses (24); R.D.C. surveyor.

Eston (YORKS).—Houses (156), Grangetown Village Estate; A. W. Cockersoll, surveyor, Council Offices.

Exeter.—Church for St. Mark's; E. F. Hooper, architect, Bedford Circus.

Glasgow.—Houses, Bellahouston (350) and West Drumoyne (104); housing director and trade contractors. Shops, Paisley Road; J. C. M'Kellar, Ltd. Alterations to the factory for Wilson, Blackadder & Co.; J. G. Aitchison, architect, 170, Hope Street. Reconstruction of Kenilworth Hotel; Kenilworth Hotel (Glasgow), Ltd.

Hartshorne and Seals.—Houses (50); Parks & Sons, builders, Long Eaton.

Hull.—School extensions (£37,000); city architect.

Hyde.—Houses (176), Bradley Green; borough engineer.

Ilford.—Shops and houses, Chadwell Heath Lane; A. W. Heppell. Shops and houses, Eastern Avenue; Holland Bros.

Inverness.—Creamery, Pumpgate Street and Telford Road (£6,800) for the Co-operative Society, Ltd.; secretary.

Isle of Axholme.—Houses (28); J. T. Battye, R.D.C. surveyor, High Street, Epworth, Doncaster.

Keighley.—Extensions to Institution, Cartmell Road; J. B. Bailey & Son, Airedale Buildings, North Street.

Kent.—Boys' school, Gravesend (£43,000), and enlargement of Mayplace Road School, Crayford, for E.C.

Kirkcaldy.—Branch library and child welfare clinic (£8,000); burgh surveyor.

Leadgate.—Houses (46), Front Street; J. H. Ayton, builder, 5, George Street, Blackhill, Durham.

Leeds.—Buildings, Gelder Road and Town Street, Armley; E. & T. L. Armitage. Shops, Oakwood Lane and Easterly Road; F. J. O. Montagu.

Lincoln.—Houses (40), Simon's Hill site; city surveyor.

Liverpool.—Houses (237), Huyton Farm Estate; Middleton & Co. (Blackpool), Ltd., builders. Banks Street Sidings.

London.—(ACTON).—Houses (52), Ashfield Road; L. E. Marsh, architect, Omer Avenue, Margate. Two factories, Victoria Road; H. Butcher & Co., architects, 63, Chancery Lane, W.C.2. (BROCKLEY).—Houses (116), Brockley Hall Estate; H. Macintosh, Croydon. (EALING).—Houses (22), Rydal Crescent; R. Lancaster & Sons, 30, Ealing Road, Wembley. Additions, &c., King Edward Memorial Hospital, Mattock Lane; Hall-Jones & Partners, architects, Haven House, Haven Green, W.5. Flats and Houses, Twyford Avenue; B. Smith & Son (Builders), Ltd., Estate Office, Halsbury Road West, Northolt. Flats (24), Gunnersbury Avenue and Tudor Way; G. P. Bath, architect, 46, Lincoln's Inn Fields, W.C. Factory, Wadsworth Road, for R. Warburton; P. Bilton, Ltd., 113, Park Street, W.1. Rebuilding of 30, Broadway; H. Braddock, architect, 45, Dennis Park Crescent, S.W.20. (HACKNEY).—Tenements, Northwold Road (£52,000); L.C.C. architect. (ISLINGTON).—Dwellings (109), Sebbon Street; borough engineer. (KENSINGTON).—Nurses' home, St. Abbotts' Hospital (£6,375); L.C.C. architect. (LEWISHAM).—Houses (198), Northbrook Park Estate; Chart, Son & Reading. (NORWOOD).—Alterations and additions, St. Joseph's R.C. School, Crown Hill; F. K. A. Walters & Son. (PECKHAM).—Health centre (£35,000), with cafeteria, lecture rooms and laboratories, for the Pioneer Health Centre, Ltd.; Hon. Ewen Montagu. (WESTMINSTER).—Rebuilding, 11-5, Sherwood Street, and 36-41, Brewer Street; F. J. Wills.

Manchester.—Bank, King Street; Midland Bank, Ltd.

Middlesbrough.—Branch premises, Acklam Road (£3,500); C.W.S. Building Dept., West Blandford Street, Newcastle-on-Tyne.

Newcastle-on-Tyne.—Cinema (1,300 seats), Fenham, for S. Rogers, Ltd.; H. D. Burton, builder, King Street, North Shields. Extensions for Armstrong Whitworth & Co. (Engineers), Ltd., Scotswood Road.

Newport (MON.).—Houses (89), Somerton Road; F. R. Bates and Son. Baths; borough engineer. New premises for South Wales Argus, Ltd., Market Street; C. E. Tebbs.

Nottingham.—School (300 places), Gelding, for E.C.

Oldham.—Houses (386), with electrical installations; J. Hobson and Sons, Ltd., builders, Newark Street, Nottingham.

Patcham.—Houses (40), Ladies' Mile Estate; G. Furguson & Sons.

Perranporth (CORNWALL).—Extensions, Droskyn Castle Hotel (£2,000); A. J. Cornelius, architect, Truro.

Pontefract.—Extensions, General Infirmary (£45,000); Tennant and Smith, architects.

Portland.—Houses (22), Avalanche Road; L. G. Osborne. Council offices (£8,790); Jesty & Baker, Ltd. Showrooms, Victoria Square; Craven Bros.

Portobello.—Church for Portobello U.F. Church; Rev. S. W. Wilson, minister.

Renfrew.—New pavilion and alterations to Blawart Hill Hospital (£7,900); clerk, Renfrew and Clydebank Joint Hospital Board.

Romford.—Houses (54); F. B. Martin. Houses (28), Hillfoot Avenue; H. Bradshaw. Shopping arcade, South Street, for Upsons, Ltd.

Salford.—Wing, Home of Our Lady of Lourdes, Didsbury Lodge, Wilmslow Road (electrical installation); Moston Brick and Building Co., Ltd., Moston, Manchester.

Sheffield.—Factory for Viners', Ltd., Bath Street (electrical installation); Reeves Charlesworth, Ltd., builders, Holme Lane, Hillsborough.

Short Heath (WOLVERHAMPTON).—Houses (42); J. Hicken and Sons, builders.

Shrewsbury.—Houses (79), Copthorne Road, Atcham; W. A. Sherratt, builder, Church Stretton. Infants' school, Racecourse Crescent (£4,375), for E.C.

Sompting (SUSSEX).—Estate development; A. Clare, Ltd.

Stourport.—Houses (80); M. Wilesmith & Son, builders, Malvern Link.

Surrey.—School, Hinchley Wood, Esher, and remodelling church schools, Godstone, for County E.C.

Taunton.—Houses (90), Lyngford site (£24,013); Standerwick and Sons, contractors, Bridgwater.

Truro.—Stores depôt, Town Quay (£5,000); borough surveyor.

Wealdstone.—Houses (28), D'Arcy Drive; John Turner.

West Riding.—Schools, Adwick-le-Street and Sprotborough; director of education, Wakefield.

Whitby.—Houses (36); Hays & Gray, U.D.C. architects, Central Chambers, Wingate, Co. Durham.

Willington (DURHAM).—Houses (24); D. McIntyre, U.D.C. architect, Durham.

Windsor.—Business stores, Peascod Street, for Montague Burton, Ltd., Leeds; staff architect.

Worthing.—Reconstruction of theatre, Bath Place; S. H. Burwood.

New Safety Requirements on French Ships

THE French Ministry of the Merchant Marine has issued a number of supplemental regulations which stipulate that all passenger vessels of over 10,000 tons must be provided with two separate wireless telegraph receiving and transmitting installations situated in different parts of the ship. Electric lighting and power installations must be of the lowest possible voltage. Suitably-insulated single-conductor cables should be used and cables having steel wire or metal strip sheathing should be fixed by metal clips to the angle irons in contact with the hull; or, if the use of the angle irons is difficult, the conductors should be secure to the deck planking and given a metallic connection to the hull. So far as is possible all electric wiring and cables should be visible; if this is not the case, they must be so installed as to be readily accessible for inspection and maintenance purposes. Another regulation requires that all fuses used must be of a safety type that cannot be tampered with.